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The Legitimacy of Selected Watershed Organizations in the Midwestern United States

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THE LEGITIMACY OF SELECTED WATERSHED MANAGEMENT ORGANIZATIONS IN THE MIDWESTERN UNITED STATES

by

Bruce M. Hall

B.A., University of Kansas, 1980
M.A., University of Kansas, 1984

A Dissertation
Submitted in Partial Fulfillment of the Requirements of
Doctor of Philosophy

Department of Environmental Resources and Policy
in the Graduate School
Southern Illinois University Carbondale
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DISSERTATION APPROVAL

THE LEGITIMACY OF SELECTED WATERSHEDS IN THE MIDWESTERN UNITED STATES

By

Bruce M. Hall

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the field of Environmental Resources and Policy

Approved by:

Professor Steven Kraft, Chair
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Graduate School
Southern Illinois University Carbondale
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TITLE: THE LEGITIMACY OF SELECTED WATERSHED MANAGEMENT ORGANIZATIONS IN THE MIDWESTERN UNITED STATES

MAJOR PROFESSOR: Dr. Steven Kraft

Legitimacy in natural resource management refers to the degree to which citizens accept and comply with stated goals and policies. Lack of legitimacy can threaten collaborative-based watershed groups that rely on voluntary compliance to achieve their water quality goals. These groups are locally-based, and sprouted up due to the complexities and political barriers that have prevented better control of non-point, or diffuse, pollution off the landscape and into streams and lakes. One of the most cited requirements for legitimacy in natural resource collaborations is inclusive representation.

An exploratory study of several watershed groups in Wisconsin and Illinois uncovered a worrisome exclusion of key stakeholders in the watershed along with an absence of certain demographic groups. Key underrepresented stakeholders included farmers, federal government officials, and national environmental groups. The absence of farmer participation is especially troubling considering the large amount of agricultural land contained within two of the basins studied. In addition, the voluntary nature of watershed group collaboration led to a stilted demographic base, with white males of higher income and education dominating the process. Public participation in watershed groups has been cited numerous times in the literature as a key ingredient of legitimacy, yet it seems that the citizens in the watershed rely on elected officials for their representation. Results from this survey uncovered a lack of participation by elected
officials, however, and this provided another barrier to inclusive and high-quality representation in watershed organizations.

Another common feature of watershed collaborations is consensus decision-making, but these consensus groups often exhibited exclusion of “difficult” stakeholders, as well as self-exclusion of people who lacked patience with the time-consuming nature of the process. Survey results also indicated that some people felt contentious issues were being avoided in an attempt to reach consensus, as was documented in the literature.

Accountability was an identified as a threat to legitimacy in both the focus groups and surveys, and there were doubts about follow-through once projects were agreed upon. Umbrella organizations that provided capacity-building and scientific expertise would often switch to other funded projects, and some wondered if outcomes could be maintained. Government was often cited in the surveys and focus groups as an entity that can be used to foster accountability, but the same respondents seemed to detest more government regulation while embracing accountability. Overall, respondents seemed conflicted about the role of government in these collaborations.

Lack of trust was found to be very intense in the two Wisconsin watersheds, due mostly to run-ins with the Department of Natural Resources (DNR). Lack of trust spurred participation in watershed groups, particularly, when property owners lived lakeside. Meetings would become crowded as landowners wary of regulation or restrictions on their property came to protect their turf. While lack of trust may encourage participation, it also reduces overall legitimacy in the three watersheds studied in this paper, and still appears to be a large stumbling block to legitimacy despite many years of effort. Scientific uncertainty regarding sources of
pollutants added to distrust between municipalities in the Illinois watershed, and this was exacerbated by a paucity of monitoring stations and baseline data.

The watershed groups studied in this paper were three of the most successful and long-standing collaborations in this region -- and benefitted from effective leadership, capacity-building at multiple scales, transparency, and quality representation. But even in these groups many red flags emerged to threaten legitimacy, and hence the long-term sustainability and success of such groups. More research is needed to test some of the ideas uncovered here, but relying on a voluntary-approach to deal with the insidious problem of non-point source pollution may be a recipe for disaster. Alternative management strategies must be developed to combat runoff pollution, and it seems that more regulation and strict benchmarks should be instituted at the local level --- and be nested within larger scales at the state, regional, and federal level. In this type of strategy the local government would provide the “sticks” with land-use controls and pollution fees, and the state could be a source of “carrots” in the way of funding for projects.
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Many people are typically involved in assisting students in the completion of a dissertation, and I am no exception, having been the recipient of many well-meaning friends and colleagues. There are two individuals who I am especially appreciative of, because without them this dissertation would never have been completed. The first is my friend and dissertation advisor Dr. Steven Kraft, who initially realized the importance of the legitimacy question in watershed collaborative planning, and imparted his wisdom to me and got me headed in the right direction for my research in this area. Many times over the years, Steve provided invaluable guidance to me and kept me on the right track, despite numerous detours. He graciously offered me his expertise and spent numerous hours of his time to help advance my career -- not just with this dissertation, but also assisting me with presentations at conferences, professional contacts, peer-reviewed publications, and many other ways too numerous for me to recall. All of his efforts went above and beyond the normal responsibilities of a PhD advisor, and I consider myself very lucky to have benefitted from his friendship and mentoring through a difficult process.

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>i</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>x</td>
</tr>
<tr>
<td>CHAPTERS</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 1 – Introduction</td>
<td>1</td>
</tr>
<tr>
<td>CHAPTER 2 – Literature Review and Related Research</td>
<td>13</td>
</tr>
<tr>
<td>CHAPTER 3 – Objectives of Research</td>
<td>60</td>
</tr>
<tr>
<td>CHAPTER 4 – Methodology</td>
<td>67</td>
</tr>
<tr>
<td>CHAPTER 5 – Focus Groups: Analysis and Results</td>
<td>98</td>
</tr>
<tr>
<td>CHAPTER 6 – Survey Data: Analysis and Results</td>
<td>236</td>
</tr>
<tr>
<td>CHAPTER 7 – Summary and Conclusions</td>
<td>365</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>406</td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>Appendix A – Questions for the Legitimacy Index Calculation</td>
<td>426</td>
</tr>
<tr>
<td>Appendix B – All Survey Questions</td>
<td>427</td>
</tr>
<tr>
<td>Appendix C – Indicators Used to Formulate Hypotheses</td>
<td>450</td>
</tr>
<tr>
<td>Appendix D – SPSS Output of Statistical Tests</td>
<td>472</td>
</tr>
<tr>
<td>Appendix E – Histograms of Data Distribution</td>
<td>517</td>
</tr>
<tr>
<td>Appendix F – Charts for Elements of Legitimacy</td>
<td>556</td>
</tr>
<tr>
<td>VITA</td>
<td>582</td>
</tr>
</tbody>
</table>
LIST OF TABLES

TABLE    PAGE
Table 4.1 – Major Elements of Legitimacy .................................................................75
Table 4.2 – Possible Likert Choices for Survey Respondents ...............................................83
Table 4.3 – Weights Based on Literature Review ..........................................................86
Table 4.4 – Weighting System 1 ....................................................................................92
Table 4.5 – Weighting System 2 ....................................................................................93
Table 4.6 – Weights Based on Survey Respondent Rankings ........................................94
Table 4.7 – Final Weights Comparison – Survey vs. Literature Weights ..............................94
Table 4.8 – Mann Whitney U Test – Survey vs. Literature Weights .....................................95
Table 5.1 – Summary Table of Common Themes in Focus Groups ...................................234
Table 6.1 – Legitimacy Index Values for All Respondents ...............................................238
Table 6.2 – Average LI Value for Each of the Three Watersheds ......................................242
Table 6.3 – Tests for Legitimacy Index Values ................................................................245
Table 6.4 – Scale vs. Legitimacy and Other Variables ....................................................258
Table 6.5 – Pair-Wise Comparison of Consensus Categories – Mann Whitney U ...............265
Table 6.6 – Consensus vs. Legitimacy and Other Variables ............................................279
Table 6.7 – Demographic Diversity - Percentage Breakdown for Respondents ..................281
Table 6.8 – Stakeholder Grouping for Statistical Testing ................................................291
Table 6.9 – Survey Respondents by Stakeholder Group ..................................................291
Table 6.10 – Test Results - Demographic Diversity vs. Perceived Legitimacy .....................300
Table 6.11 – Ethnic Make-Up of Survey Respondents vs. Citizens in Watershed .................304
Table 6.12 – Gender Make-Up of Survey Respondents vs. Citizens in Watershed ....................306
Table 6.13 – Education of Survey Respondents vs. Citizens in Watershed ...............................307
Table 6.14 – Income of Survey Respondents vs. Citizens in Watershed .................................309
Table 6.15 – Deliberation Process in my Watershed is Inclusive ........................................311
Table 6.16 – Respondents Who Believe Their Watershed is Inclusive ....................................311
Table 6.17 – Few Elected Officials Participate in Watershed Groups ......................................313
Table 6.18 – Percentage of Those Who Believe Few Elected Officials Participate ....................314
Table 6.19 – Votes for Each Stakeholder Group and Sorted by Watershed ...............................316
Table 6.20 – Summary of Demographic Diversity – Percentage by Watershed .......................323
Table 6.21 – Votes of the Top Five Most Influential Stakeholders .........................................326
Table 6.22 – Votes of the Top Five Most Influential Stakeholders .........................................329
Table 6.23 – Votes of the Single-Most Important Stakeholder ................................................331
Table 6.24 – Chi Square Frequency Table – Trust vs. Watersheds ........................................336
Table 6.25 – Chi Square Frequency Table – Trust vs. Consensus ........................................338
Table 7.1 – Summary Table of Common Themes in Focus Groups ........................................367
Table 7.2 – Average LI Value for Each of the Three Watersheds ........................................380
Table 7.3 – Tests Comparing the LI Values of Watersheds vs. Weighting Systems ..................380
Table 7.4 – Tests for Impacts of Scale, Consensus, and Diversity on LI Values .......................384
Table 7.5 – Summary Results for Effects of Scale, Consensus, and Diversity .........................388
Table 7.6 – Results of Statistical Tests for Scale, Consensus, and Demographics ....................388
Table 7.7 – Summary Results for Threats to Legitimacy ......................................................392
<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 5.1 - Map of the Rock River Basin</td>
<td>99</td>
</tr>
<tr>
<td>Figure 5.2 – Land Use in the Rock River Basin</td>
<td>100</td>
</tr>
<tr>
<td>Figure 5.3 – Rock River Watershed, Jefferson County</td>
<td>102</td>
</tr>
<tr>
<td>Figure 5.4 – Rock River near Oconomowoc, WI</td>
<td>103</td>
</tr>
<tr>
<td>Figure 5.5 – Mississippi Culture near Lake Mills, WI</td>
<td>104</td>
</tr>
<tr>
<td>Figure 5.6 – Discharge into the Rock River near Watertown, WI</td>
<td>103</td>
</tr>
<tr>
<td>Figure 5.7 – Channel Diversions – Rock Walls on the Rock River</td>
<td>106</td>
</tr>
<tr>
<td>Figure 5.8 – Friends of Allen Creek</td>
<td>108</td>
</tr>
<tr>
<td>Figure 5.9 – Restoration of Native Prairie in the Rock River Basin</td>
<td>110</td>
</tr>
<tr>
<td>Figure 5.10 – Relationship between Scale, Issues, and Information</td>
<td>135</td>
</tr>
<tr>
<td>Figure 5.11 – Map of Southeast Fox River Basin</td>
<td>146</td>
</tr>
<tr>
<td>Figure 5.12 – Southeast Fox River between Waterford-Burlington, WI</td>
<td>152</td>
</tr>
<tr>
<td>Figure 5.13 – Water Filtration Plant on the Southeast Fox River</td>
<td>154</td>
</tr>
<tr>
<td>Figure 5.14 – Bank Diversion on the Southeast Fox River</td>
<td>155</td>
</tr>
<tr>
<td>Figure 5.15 – Hydrological Diversion – Dam – Southeast Fox River</td>
<td>157</td>
</tr>
<tr>
<td>Figure 5.16 – Riparian Vegetation on the Southeast Fox River</td>
<td>159</td>
</tr>
<tr>
<td>Figure 5.17 – Fishing on the Southeast Fox River near Burlington, WI</td>
<td>161</td>
</tr>
<tr>
<td>Figure 5.18 – Southeast Fox River Flowing near Waterford, WI</td>
<td>162</td>
</tr>
<tr>
<td>Figure 5.19 – Relationships between Elements of Legitimacy</td>
<td>180</td>
</tr>
<tr>
<td>Figure 5.20 – Factors Affecting Participation in the Watershed</td>
<td>183</td>
</tr>
</tbody>
</table>
Figure 5.21 – Map of Southeast Fox River flowing into Illinois ...................................... 186

Figure 5.22 – Location of Poplar Creek Watershed in Illinois ................................. 187

Figure 5.23 – Municipalities and the Forest Preserve of Poplar Creek ...................... 188

Figure 5.24 – Poplar Creek Watershed in Northeastern Illinois ............................... 191

Figure 5.25 – Native Prairie in the Poplar Creek Watershed ................................. 193

Figure 5.26 – Mixed Suburban-Recreation in the Poplar Creek Watershed .............. 195

Figure 5.27 – Suburban Development in the Poplar Creek Watershed .................. 206

Figure 5.28 – Recreational Use of Poplar Creek Trail ............................................ 207

Figure 6.1 – List of Representatives in the Three Watersheds ................................. 319

Figure 6.2 – The Five Most Influential Stakeholder Groups ................................. 328

Figure 6.3 – The Three Most Influential Stakeholder Groups ............................... 330

Figure 6.4 – Avoidance of Contentious Issues in Consensus Groups .................... 346

Figure 6.5 – The Most Important Issues are always Addressed ............................. 346

Figure 7.1 – Will Watershed Collaboration Improve Water Quality ....................... 405
CHAPTER 1

INTRODUCTION

(A) The Watershed Approach: A New Paradigm

The topic of this dissertation, legitimacy of watershed collaborative groups in the Midwest, is linked to a dramatic transformation in the approach for dealing with water quality issues in the United States. At the core of this transformation is a movement away from regulations and towards a heavy reliance on collaboration. Known as the watershed approach (Sabatier et al 2005; Born and Genskow 2000; National Research Council 1999), this new paradigm depends on the voluntary compliance of stakeholders rather than command and control laws such as the Clean Water Act. Water resources management using the watershed approach displays certain common characteristics including: (1) a focus on democratic and inclusive resource decision-making, (2) a geographic or placed-based mode of analysis (the watershed), and (3) a reliance on voluntary compliance and implementation of plans and projects. The watershed approach also attempts to integrate physical and environmental problems in the watershed with socio-economic conditions and other human related factors (NRC 1999; Barham 2001). Barham (2001) refers to this ecological-human interconnectedness as "boundary coherence," and sees it as a natural extension of the ecosystem approach. Tarlock (2002) uses the term "ecosystem revival" to describe a paradigm that focuses on long-term survivability of ecosystems and management activities that enhance that goal, rather than preservation of nature in a pristine condition or strict regulation of pollution control, two earlier paradigms. The watershed approach relies heavily on the ecosystem approach or ecosystem revival, as Tarlock
describes it. In Australia, the term "governance" is sometimes used to describe a voluntary approach based on education and best management practices (Wallington, Lawrence, and Loechel 2008).

Sabatier and others (2005) include face-to-face collaboration and the use of professional negotiators or facilitators as other key ingredients of the watershed approach. Sabatier calls this the "collaborative engagement process" and includes it as one of his two variants of the watershed approach. The other two variants he discusses are collaborative watershed partnerships, the focus of this study, and collaborative superagencies such as the California Resource Agency’s Bay-Delta Program (CALSFED) (Sabatier et al 2005).

The face-to-face collaboration of the collaborative engagement process is needed to resolve conflicts and attain consensus among the many stakeholders involved in the process. Consensus is often mentioned as a requirement for the watershed approach, but there is some divergence on that point within the literature and this will be discussed in greater detail later in this paper. In any case, the watershed approach is often cited as a better paradigm for dealing with the complex and interconnected problems that occur within a given watershed.

The watershed approach is similar to integrated water resources management (IWRM) in that it seeks to elicit cooperation from different local, state, and federal governmental agencies, as well as from non-governmental stakeholders. This is done in order to advance the goals and issues from different sectors within the watershed together, rather than portioning out responsibilities and projects based on agency agendas and jurisdiction (Mitchell and Hollick 1993; Margerum and Hooper 2001). As such, the watershed approach exhibits clear similarities to Integrated Water Resources Management (IWRM), and the two often overlap, but the scale of the latter is typically much larger and often encompasses a river basin (Hooper 2005).
IWRM and the watershed approach strive to attack multiple problems at the same time in a holistic fashion, and to move away from the top-down, agency-driven bureaucracies that typified decision-making in the past. Agency competition and competing demands for water resources from different economic sectors are usually much less of an issue in the smaller watersheds, particularly in Midwestern watersheds where the allocation of water is less of an issue than water quality. Consequently, smaller watersheds focus on watershed groups and partnerships, some of which are involved in planning and others of which are more focused on the voluntary implementation of projects and the implementation of best management practices. IWRM typically utilizes a larger and more diverse group of agency participants due to its larger scale and scope. Due to its larger scale of operation, there is more of a call for "strategic" targeting of issues in IWRM and the setting of priorities (Hollick and Mitchell 1993) than that seen in smaller watersheds using the watershed approach.

(B) History of Water Pollution Control: How Did We Get Here?

Why did the United States and many other nations move away from regulation and embrace the collaborative method to solve water resource issues, especially with regards to non-point source pollution? In order to answer that question, a brief summary of water pollution control in the United States can be insightful. In the United States, the passage of the Clean Water Act (CWA) in 1972 led to dramatically improved water quality in lakes and streams. Discharges of toxic pollutants were reduced by close to a billion pounds per year (Adler 1994). Most of this success, however, came via the reduction of point discharges from sources such as
waste treatment plants and industrial facilities. This was done by mandating best available
technology (BAT) to reduce the amount of pollutants originating from these locations.

The issue of nonpoint pollution, or "diffuse pollution," is another story entirely and is a
primary reason many of our streams and lakes still do not meet “fishable and swimmable”
standards as laid out in the original statute. Much of the problem originates in these nonpoint
sources, or runoff as it is often called, and these sources have proven to more problematic. Two
decades ago roughly 65 percent of all water pollution in the United States resulted from nonpoint
sources (Doppelt et al 1993) and the EPA declares on its website that “non-point source pollution
remains the nation’s largest source of water quality problems (EPA 1996).” Agriculture is the
biggest contributor to nonpoint source pollution in the United States (U.S. EPA 1998).

Alleviating the effects of these non-point sources is a challenging task (Williams et al. 1997;
Lant 2003) because nonpoint pollution is not readily controlled via regulation, and laws are not
often proposed as a solution to this problem (Ruhl et al. 2003). It is largely due to this failure to
contain the complex and insidious problem of nonpoint source pollution that this switch to the
watershed approach has occurred. So, rather than utilizing the regulatory approach that was so
effective in ameliorating the effects of point-source pollution, the focus in recent decades has
been on a voluntary, incentive-based approach for dealing with non-point sources.

In their recent book, Swimming Upstream: Collaborative Approaches to Watershed Management (2005), Sabatier and colleagues label the era of U.S environmental management since 1987 the “watershed collaborative” era. They refer to this shift from an agency dominated strategy to a multi-stakeholder, collaborative approach as a “quiet revolution.” The paradigm shift is attributed to four factors: (1) a disenchantment with the traditional approach to solve water resource problems, (2) increased competition for fresh water, (3) increased focus on Total
Maximum Daily Loads (TMDL's) of the Clean Water Act, and (4) skepticism of “legalistic agency processes” for crafting long-term solutions to complex water resource problems, such as non-point source pollution.

Even before the advent of the collaborative era around 1987, previous time periods in U.S. history exhibited certain elements of this new watershed approach. In chapter two of that same book (Sabatier et al. 2005), Sabatier, Wieble, and Ficker identify five environmental eras in United States history, and describe which characteristics of collaborative watershed management were utilized in each era. The five characteristics of the watershed approach they identify are: (1) a watershed based jurisdictional boundary, (2) a mixture of public and private stakeholders in decision-making, (3) the use of non-experts in the process, (4) a "true collaborative approach" versus simple consultation, and (5) a balance between economic development and environmental protection.

All five eras, except for the Manifest Destiny Era which lasted from our country's beginnings until about 1890, utilized at least one or more of these five watershed approach characteristics. During the Manifest Destiny Era there was no real watershed planning, rapid expansion and growth were the only major goals, and there was no effective advancement of environmental protection. The United States government promoted policies to dispose of public lands to settlers, and water was used only to fuel economic development. John Wesley Powell's keen observations of the importance of watersheds led to his call for using hydrographic units to determine political jurisdictions, but even his insights were ignored during this time. Instead, the Manifest Destiny Era turned out to be a period in our history when no aspects of collaborative watershed management were adopted.
In the "Progressive Era between 1890 and 1924," some of Powell's ideas were at last adopted and the watershed was used as a unit for environmental management in some areas of the western United States. Powell had advocated for the use of "natural districts" delineated by watershed boundaries as well as the allocation and regulation of water resources by the federal government. Teddy Roosevelt likewise called for the management of every river from its headwaters to its mouth. The Progressive Era also adopted the second characteristic of watershed collaboration; a multi-stakeholder approach to balance economic and environmental goals (Sabatier et al 2005). It was during this period that civil service experts were called upon to render decisions based on science and data. Such decisions were supposed to be less muddied by local politics and were an attempt to curb the corruption of earlier times.

The New Deal Era between 1925 and 1964 continued the use of the watershed concept, multi-use planning, and bureaucratic experts. In addition, it was the first era to link land and water resources as evidenced by the managerial methods of the Soil Conservation Service (SCS) and the Tennessee Valley Authority (TVA). As in the Progressive Era, governmental regulation and decision-making by bureaucrats was again used as a buffer to thwart abuses in the market place. Large water resource projects on a river basin scale, such as the Owens Valley Project and the Tennessee Valley Authority, were completed. Small-scale watershed planning was mostly done by the SCS, later to be known as the Natural Resource Conservation Service (NRCS) (Sabatier et al 2005).

It was noted by Sabatier et al. (2005), however, that both the Progressive and New Deal Eras were missing several key characteristics of a true watershed approach: namely the inclusion of all stakeholders in the process, an emphasis on environmental concerns equal to those of economic development, and distributive justice. The first two were added in the Environmental
Era between 1965 and 1986 mostly by way of litigation from environmental groups. These lawsuits fostered greater stakeholder consultation and involvement, increased environmental protection, and enhanced capacity building at the state and local level. The authors of *Swimming Upstream* (2005), however, bemoan the fact that certain backward steps were taken. At the same time that environmental protection and formerly ignored stakeholders were finally getting equal treatment; resource management moved away from the watershed approach and the multi-use planning paradigm that was fairly effective in early years. In addition, lack of equity and justice in the outcomes of resource planning continued to be a major deficiency.

It was during this Environmental Era (1965-1986) that major environmental laws were passed: including the Clean Air Act (1970), the Clean Water Act (1972), the National Environmental Policy Act (NEPA 1969), the Endangered Species Act (1973), and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund," 1980). These laws often had strict requirements that far exceeded those of previous eras, and along with the environmental litigation mentioned above, led to significant decreases in environmental degradation and pollution (Percival et al. 2003). Dramatic environmental disasters such as the Santa Barbara Oil Spill and the burning of the Cuyahoga River were also important catalysts in rallying support for strict environmental regulation.

So if we look back to the advent of the Watershed Approach era in 1987, great strides had been made in fostering environmental protection and true inclusive participation in resource management, but there was a drift backwards regarding holistic, ecosystem approaches to solving resource-related problems. In addition, distributional justice still continued to be an elusive concept foreign to resource management and pollution control efforts. Most new environmental regulations failed to use the ecosystem approach or the multi-use planning
approach that had been so effective during the New Deal Era. Another problem was that litigation encouraged competition at the expense of consensus-type solutions and true legitimacy. Environmental policy was therefore undemocratic and ineffective for dealing with complex problems such as nonpoint source water pollution. It was the failure of the legislation of this era, mainly the ineffectiveness of the Clean Water Act to deal with nonpoint source pollution, as well as the legitimacy failures of an inflexible regulatory structure, that eventually led to the watershed era that we see today (Sabatier et al. 2005).

These drawbacks set the stage for a new era of environmental management known as the Watershed Era. During this era many watershed organizations worked to include all stakeholders in true consultation, made commitments to involve all segments of government, and strived to utilize professional mediators to achieve win-win solutions. The focus of the collaborative approach has also filtered down to smaller watersheds, which generally include greater local involvement. Finally, for the first time in history, equity and justice issues have been addressed in a serious manner and are included as an integral part of collaborative goals (Sabatier et al. 2005).

But Sabatier noted the problems associated with this new era of watershed management as well. Among these problems are an absence of trust on the part of national environmental interests who are skeptical of local control, few guarantees that outcomes will result in better physical or socioeconomic conditions in the watershed, and issues of legitimacy (Sabatier et al. 2005). The last of these will be the major focus of this research paper.
(C) **Proliferation of Placed-Based Water Resources Management and Determinations of their Success**

There is no doubt that we have entered a new era of water resources management in the United States and most of the developed world. As outlined in *Swimming Upstream* (2005), the complex problem of non-point source pollution and the decline of aquatic ecosystems in the 1980’s and 1990’s has led to an increase in the development of these watershed-scale planning initiatives. Known by such names as “place-based,” “community-led,” “locally-led,” or other similar terms, these collaborative-based initiatives now number over 1000 and are growing rapidly (Moore and Koontz 2003). Watershed organizations, or “partnerships” as they are sometimes called, exist throughout the United States to deal with water quality and water quantity (allocation) issues in streams, lakes, and groundwater aquifers. In western states, allocation of scare water resources in arid and semi-arid basins is a common problem for watershed collaborations. In five Midwestern states (IL, WI, MI, OH and IN) where agricultural runoff is a major contributor of non-point source water pollution, there were approximately 241 locally-led watershed partnerships as of 2004 (CTIC 2004) that existed to primarily address water quality problems. I contacted the Conservation Technology Information Center (CTIC) in March of 2013 to get updated information, but was told that 2004 was the last year they compiled this type of information. I was directed to the “Adopt Your Watershed” section of the EPA website ([http://water.epa.gov/action/adopt/index.cfm](http://water.epa.gov/action/adopt/index.cfm)) where I found a database that contained exactly 3800 groups involved in watershed protection and water quality improvement efforts. This group was a broader range of organizations than the one compiled by CTIC because it included conservation groups, clubs, and schools, in addition to the more formal, agency
driven watershed partnerships. Still, this list is impressive and illustrates the large number of educationally based, voluntary groups that were set up to deal with non-point source pollution and other threats to waterways in the United States.

Because the nation is depending almost entirely on these types of watershed collaborations in order to solve the complex problem of non-point source pollution, it becomes necessary to ask the question, “Will these groups prove successful in the long-term?” There is already a great deal of debate about whether such watershed groups and other natural resource collaborations will indeed succeed. Some believe these groups represent a “devolution” of government’s role in protecting the environment in favor of local interests. Typical of this criticism is a chapter in Beyond Backyard Environmentalism in which Wilson and Weltman state, “It is the government’s job to protect public health and the environment; it should not be the obligation of citizens to join “stream teams” or publicize the Toxic Release Inventory (TRI) data in order to enjoy clean water and air (2000).” Another author in the same book, Jacqueline Savitz, also sees the collaboration movement as a way for government to abdicate its responsibility. She states, “After centuries of human impacts on the American environment, it is premature to label three-decade-young 'traditional regulations' a failure.” Jim Britell (2007) is another author who skewers resource collaborations, calling it “partner-mania” and stating that it is a “fruit of Neo-Liberalism, a large and rapidly growing political movement that attempts to avoid inconvenient and unpopular policy responsibilities like environmental laws – it’s what you get when you cross ‘All you need is love’ with spreadsheets.”

Because most of these collaborative organizations have existed for a relatively short length of time, and there is a lack of baseline and post-project monitoring data in most cases, it is very difficult to assess improvements in the physical environment of watersheds (Leach, Pelkey,
and Sabatier 2002). Kenney (2000) illustrates this problem when he says, “many environmental problems are the result of decades of abuse or ignorance, and tangible, measurable progress cannot realistically be expected in many cases for decades. Consequently, imposing this definition of success on a community-based watershed restoration can be unfairly burdensome.” Complicating the issue is the paucity of water quality data in most areas. Sabatier et al (2005) in Chapter 1 of their book, discuss watershed planning processes and contexts, but bemoan that “watershed outcomes are “probably the most important but also the most difficult” of all the variables to measure. They illustrate the problems of monitoring physical improvements to watersheds when they state, “Unfortunately, very few collaborative partnerships possess this sort of monitoring data, making it extremely difficult to ascertain their actual impacts. Instead, most studies, including ours, rely primarily on perceived impacts.” For these reasons, it may be better to evaluate success for these partnerships based on socio-political rather than bio-chemical-hydrological factors, and focus on Sabatier's "perceived impacts" rather than the "actual impacts." (Sabatier et al. 2005).

One such socio-political factor is the legitimacy of these groups. Very little research has been conducted on the legitimacy of watershed organizations, but studies of other natural resource collaborations have shown that the lack of legitimacy can be a serious impediment to effective planning efforts (Mikalsen and Jentoft 2003; Harte 1999; Jentoft 2000; O’Riordan and Ward 1997; Wilson and McCay, Hanna 1995; Fletcher 2003, Sekher 2001; Webler and Renn 1995; Schuett, Selin and Carr 2001, Sabatier et al 2005). Legitimacy is no guarantee of success in watershed planning, but the lack of this critical element can threaten efforts to protect and improve water resources. In this manner, legitimacy can also serve as a surrogate indicator of success in watershed planning processes. Plans derived from processes perceived as legitimate
are more likely to invoke the type of cooperation required from watershed residents and stakeholders. Therefore, legitimacy acts as a necessary but not sufficient condition for the success of watershed planning efforts. Conversely, any fatal flaws in process and plan that threaten water resource management efforts can be identified and dealt with in a pro-active manner. Trachtenberg and Focht (2005) believe that legitimacy is one big factor in determining whether watershed organizations survive. Sabatier and others (2005) state, “We confidently conclude that survival in this sense is a function of both procedural and substantive legitimacy. We hypothesize that collaborative institutions meeting the criteria of procedural and substantive legitimacy are more likely to survive.” For these reasons, the examination of the legitimacy of watershed organizations is a worthwhile undertaking that should serve to contribute to the knowledge base of water resource planning, as well as facilitate efforts to improve water quality in our nation’s streams, lakes, and aquifers.
CHAPTER 2
LITERATURE REVIEW AND RELATED RESEARCH

A comprehensive literature review of the legitimacy of watershed organizations and other natural resource planning groups has been conducted for two purposes. The first is to define legitimacy as it relates to natural resource management, and the second is to identify specific elements of legitimacy associated with watershed planning.

The task of defining legitimacy could be a research topic in itself as varying authors and theorists have different takes on its meaning. Much of the relevant literature review for this topic has revolved around the search for a reasonable definition of legitimacy. While disagreements exist as to the exact nature of legitimacy, there are certain elements that seem to exist in most of the definitions of the term. Areas of disagreement center mostly on the consensus, which will also be discussed here.

(A) Definitions of Legitimacy

Legitimacy is often described as a necessary ingredient to participatory democracy. How should legitimacy be defined, however? The term is ambiguous enough to warrant several different definitions. One definition is based on what might be termed "popular acceptance." Legitimacy has often been referred to as the degree of social and cultural acceptance of an institution, process or plan. That is, are citizens willing to accept and abide by a given set of rules and processes? In this definition of legitimacy, the focus is on public acceptance and the
opposing concepts of coercion and compliance. Coercion may not be required when public acceptance of rules, regulations, and norms is garnished via voluntary compliance.

Others who subscribe to this version of legitimacy are Tyler (1990), Hatcher et al (2000) and Held (1987), and they believe that legitimacy represents a perceived obligation to obey that is linked to political authority and is influenced by social norms. Huckfeldt (1989) found that many laws do not require coercion for compliance, and this was a key to his definition of legitimacy. He stated, "Compliance is also secured voluntarily, absent even the threat of sanctions for non-compliance, and therein lays the central ingredient of system legitimacy.”

Nikolic and Koontz (2005), in their work on government involvement in watershed collaborations, define legitimacy as the "degree to which the organization is viewed as representative of the community." Renn, Webler and Wiedermann (1995) likewise see legitimacy as determined by popular acceptance.

A different definition of legitimacy is based on a moral standard. The authors of *Swimming Upstream* (Sabatier et al. 2005) define legitimacy in the political realm and take the moral-type definition of legitimacy. These authors also state that legitimacy can be “measured in degrees,” and that legitimacy is a moral absolute that can never be fully attained. Sabatier et al (2005) also use the term “political legitimacy” to describe their version of legitimacy for watershed planning. They believe three elements are required for political legitimacy: autonomy, welfare, and justice. Autonomy relates to citizens' ability to control their political destiny via voting, representation, or some other method of granting consent. Welfare is the concept that centers on improving the living conditions of the population. Justice calls for the distribution of costs and benefits in a fair and equitable manner (Sabatier et al 2005).
Trachtenberg and Focht (2005), in a chapter within the Sabatier book, define legitimacy in a similar moral vein. They state that legitimacy is "the condition whereby the government's use of power is morally right." These same authors add later, however, that legitimacy in "an ideal moral standard" that can never be fully attained (Trachtenberg and Focht 2005).

Trachtenberg and Focht state that their definition of legitimacy is similar to that of Barker (1990) who stated, "legitimation involves morally justifying a political system by showing its consistency with a set of accepted moral principles (Trachtenberg and Focht 2005)."

A third way to look at legitimacy is to define it according to the process. McGuire and Sanyal (2006) lean towards the process-driven form of legitimacy advocated by Habermas (1971) who states, “legitimacy means a political order’s worthiness to be recognized." This definition highlights the fact that legitimacy is a “contestable validity claim; the stability of the order … depends on its (at least) de facto recognition (McGuire and Sanyal 2006).” Beetham (1995) sees legitimacy of power occurring when that power is acquired from agreed-upon rules, supported by beliefs shared by both the dominant and subordinate parties, and based upon the consent of all. Beetham also lists certain concepts that are required for legitimacy -- fairness, respect for every view, trust, accountability, and accommodating adjustments whenever possible -- concepts that need to be incorporated into the decision-making process. Political legitimacy as defined by O'Riordan and Ward (1997) is also process centered, and they state that legitimacy is "the shared acceptance of an outcome that might not be liked but which is tolerated because it is arrived at my means that are trusted and accepted."
When discussing the elements that seem to define legitimacy, a distinction must be made between legitimacy of process and legitimacy of outcome. Sabatier and others (2004) use the term “procedural legitimacy” to discuss a legitimate process, and conversely talk of “substantive legitimacy” when describing issues related to the final plan or outcome. Sabatier’s three elements of political legitimacy mentioned above -- autonomy, welfare and justice -- can be categorized into procedural (process) or substantive (outcome or plan) legitimacy. First, autonomy relates to people choosing their own rules and would therefore be considered part of the process, or procedural legitimacy. Second, welfare involves improving the conditions of life and would be considered an outcome type component. Third, justice relates to the fair distribution of costs and benefits and would also be related to the final outcome. Welfare and justice, therefore, are more related to the legitimacy of planned outcomes, or substantive legitimacy, whereas autonomy is a process dependent variable (Sabatier et al. 2005).

Wallington and colleagues (Wallington et al. 2008) also divided legitimacy into two components: a process oriented type called "input-orientated legitimacy" and an outcome component known as "output-oriented legitimacy.” These two types of legitimacy fit into Sabatier's categorization of procedural and substantive legitimacy. Wallington et al based their analysis of watershed governance in Australia on Beetham's conceptual map of legitimacy which consists of three elements: (1) legality, (2) justifiability, and (3) consent. They categorize those elements as either input or output oriented legitimacy.
Legality denotes the rules of the game, and includes legislation, regulations, and other non-legislative social conventions such as un-written laws and traditions, and is classified as outcome legitimacy.

Justifiability is the exercise of power as determined by a shared belief system. These beliefs underpin the source of authoritative decisions, and include both source norms and content norms. Justifiability incorporates aspects of both process and outcome legitimacy. Source norms, which include tradition and appeals to divine command, natural law, and scientific doctrine, are categorized as process legitimacy. Content norms express shared interests, or mutual gains, between government and non-government stakeholders and are more commonly associated with outcome legitimacy.

The third component of legitimacy discussed in the Wallington article is whether or not citizens consent to the decisions or governance arrangements produced by those in power. Consent, a concept also analyzed by Sabatier et al (2005), is usually thought to be part of process legitimacy because it relates to the manner in which citizens grant consent to be governed. Consent can be derived from voting, party membership, or interest group participation. Included in the idea of consent is collaborative participation and Wallington cites Parkinson (2003) on this matter, who states that these types of natural resource management arrangements represent a connection between the public sphere and the state (Parkinson 2003).

Of these three concepts of legitimacy by Beetham -- legality, justifiability, and consent -- only legality and part of justifiability (content norms) are described as outcome legitimacy. The other half of justifiability (source norms) and consent are part of process legitimacy. It should be noted that according to Parkinson's (2003) analysis of Beetham's three components of legitimacy, legality is subordinate to the other two elements because the rules themselves may be just or
unjust according to some external standard. In this sense, Parkinson is likening back to the "acceptance" definition of legitimacy as described above.

Many other authors delve into both process and outcome aspects of legitimacy, but a focus on a fair and transparent process seems to drive much of the discussion. Habermas (1975) places much of his focus on a deliberative and fair process that can work to reduce conflict and enhance common beliefs and values. In watershed collaboration much is made of this type of “win-win” consensus model of decision-making which is heavily dependent on a fair and effective process. Gutrich et al (2005) is typical of many articles that focus on a deliberative, dynamic and iterative process as a means to achieve stakeholder consensus in resource management. Other authors cited within this article also believe that stakeholder knowledge, values, and perceptions will converge over time as a result of a deliberative process (Tversky and Kahneman 1996; Corusey et al. 1987; Brown and Slovik 1988). Michaels (2001) is another author who believes in the importance of an effective process, which he concluded is often driven by salient issues within the watershed. The need for consensus in resource management is a contentious issue that will be discussed in greater detail later, but it is definitely a key reason many theorists advocate for a deliberative and legitimate process.

Despite an emphasis on a legitimate, deliberative process that is open and inclusive, the danger exists that the final plan can still be deficient with regards to legitimacy. What if the process is perfect but the outcome results in inequities and injustice toward certain groups in society? This is one of the main concerns of John Rawls in his classic work, *The Theory of Justice* (1971). Rawls sees injustices resulting from a situation whereby certain parties utilize advantages of power, wealth, and information to obtain an outcome that fails to equitably distribute costs and benefits. Rawls calls for a “veil of ignorance” whereby the actors are
unaware of their position in life -- class, race, or generation -- and thus act to obtain justice for all members of society because it may be a group that they themselves are part of. Even future generations are represented in Rawls ideal scenario because each member is also unaware of his or her generation. Such a “veil of ignorance” represents an ideal situation, of course, but it helps to lay out the goal of many collaborative organizations in the United States and elsewhere. It also points out the danger of such collaborations when power and knowledge are stilted in favor of certain groups versus others. This idea of justice in the final outcome, or “substantive legitimacy” (Sabatier 2005), is an area of intense debate and concern among natural resource scholars. It will be discussed further in this literature review as well as being a focus of research for this dissertation. Below is a literature review of major legitimacy elements that are relevant to the legitimacy of process, outcome, or both.

(C) Elements of Legitimacy

Another way to understand legitimacy is to identify the general characteristics that are often associated with the term. Certain general elements related to legitimacy were discovered time and again during this literature research, and these elements can serve as a working definition. Common elements of legitimacy will be emphasized here, with an additional discussion regarding diverging opinions about the more contentious issue of consensus. In addition, elements of legitimacy related to the process will be distinguished from elements of legitimacy related to outcome.

Some of the most commonly cited requirements for a legitimate resource management plan are: (1) effective, inclusive, and equitable participation and representation, with an emphasis
on the need to include all relevant stakeholders, including the public; (2) fairness, justice and equity of both process and outcome; and (3) an open and transparent process, including equal access to information by all stakeholders. These three requirements, along with the more contested idea of consensus, will be referred to as the primary elements of legitimacy. Other elements of legitimacy that are closely related to the first three and will be described below in greater detail are: trust, respect, accountability, a deliberative process, conflict resolution, information exchange, education and outreach, and use of scientific experts and local knowledge.

1. Participation and Representation

Participation is at the heart of legitimacy in natural resource collaborations. Who participates in watershed collaborations and how various interests are represented are two fundamental concerns regarding the legitimacy of watershed partnerships. Fletcher (2003) effectively lays out the three ways by which participation is important to the legitimacy of natural resource management. These three elements of participation are: (1) inclusiveness, (2) quality of representation, and (3) knowledge. Of these, inclusive participation seems to be the most cited requirement of legitimacy as outlined by most theorists. Quality of representation is second in importance in the literature, although the term "quality" is unique to Fletcher's work, with most researchers simply referring to "representation." The third type of participation described by Fletcher is "knowledge," which can facilitate or retard the goals of resource collaborations depending on the accuracy of such knowledge. This term is again unique to his article, with others more inclined to debate the role of scientific experts versus the use of local knowledge in participatory resource management. The role of bureaucratic experts versus local
knowledge will be discussed in a separate section due to its importance in framing scientific issues and evaluating success in watershed partnerships.

Inclusive participation can be addressed according to stakeholder interest groups or the general citizenry. I will first discuss interest group participation. Interest group, also called stakeholder representation, has been referred to in varying terms by different theorists. In *Political Theory and the Welfare State* (1990), Niklas Luhman refers to stakeholder participation as the “organized representation of interests.” Renn et al. (1995) referred to stakeholder participation as "affected interests" and outlined their importance to legitimate stakeholder participation. John Dryzek also referred to the influence of “individual interests” in his book, *Rational Ecology: Environmental and Political Economy* (1987).

The importance of inclusive participation by interest groups, or "stakeholders" as they are often called, has been noted by several authors. Harte (1999) concluded that the "politics of exclusion" regarding participation in fisheries management in New Zealand would threaten collaborations between industry and the government. Inclusive participation was seen as a key for achieving equity in Hanna’s (1995) study of user participation in the fishery industry in the Pacific Northwest. O’Riordan and Ward (1997) determined that inclusive and broad based representation in shoreline management arrangements in England achieved several goals including reducing costs, reducing the probability of "prolonged outcomes," and achieving conflict resolution and consensus. The last goal was attained via a "participatory approach" that was good at eliminating time consuming and "politically contentious" opposition. Gaining cooperation among people for local forest management in India was easier if there was a wider base of participation within the resource organizations (Sekher 2001). Mikalsen and Jentoft (2003) likewise documented that legitimacy threats to Norwegian Fisheries management
occurred because of a lack of inclusive participation. Nielson and others (2004) concluded that there was a great need for increasing local involvement in fisheries co-management in Asia and Africa. Fletcher (2002) warned that legitimacy problems could result when certain interest groups are excluded from coastal partnerships in England. In these studies, as in many others, the key issue of user participation was investigated and found to be critical to the legitimacy of both process and plan. In a study of Total Maximum Daily Loads (TMDL) plans in a Florida watershed it was found that stakeholder conflicts could be traced to flaws in the stakeholder involvement process and were mostly a result of “sub-optimal watershed stakeholder representation (Borisova, Racevskis, and Kipp 2011).”

Some models of participation have been developed, and participation has also been critical in some frameworks of resource management. Bo Rothstein, in his book Just Institutions Matter (1998), describes how different types of stakeholders, or interest groups, participate in the planning processes. He lays out six different models of participation. Rothstein refers to stakeholder participation as “interest group representation,” and identifies it as a key component of his “Corporatist Model” of participation.

Freeman et al (1996) laid out three models of participation: (1) the Cascade Model, (2) the Sectoral Model, and (3) the Thematic Model. The Cascade Model is based on a political hierarchy and as such is top-down driven. It tends to marginalize people at the bottom. The Sectoral Model uses local authority to integrate and facilitate different sectors, but is vulnerable to domination by certain interest groups. The Thematic Model most closely resembles natural resource collaborations, and is "grass roots" oriented as it seeks to "integrate diverse groups" into the participatory process. The bottom-up focus of the Thematic Model has several drawbacks, however, including a strong dependence on attaining popular and political support at an early
stage. Also, the Thematic Model can only work if there is a high degree of common interest and values among different participating groups. Finally, coordination of these diverse groups can be difficult, and the marginalization of less committed and organized groups is always a danger. In chapter 6 of Sabatier's book (2005) an analysis of several frameworks for governing natural resource management concluded that "widespread stakeholder representation" was critical in the Institutional Rational Choice (IRC) model.

While much of the literature to date has looked at the importance of including all interest groups in decision-making, there has also been some recent discussion on the need to include the general public in the deliberative process. Doremus and Tarlock, in jointly and individually authored articles (Doremus 2003; Doremus and Tarlock, 2003; Tarlock, 2003), have called on the need for “public participation” and “democratic decision-making.” The philosopher John Bohman (1996) also stressed the importance of “majority decision” and “public deliberation.” Webler and Tuler (2001) surveyed key watershed participants at a conference in Massachusetts, and found virtual consensus on the point that all stakeholders must be included in the watershed planning process. Webler and Renn (1995) make a case for broader participation in deliberations when they call for “principles of participation” based on “popular sovereignty.” It should be noted, however, that Webler and Renn also warn about the possibility of prolonged outcomes due to the large number of participants. Fletcher (2003) concluded that public participation, as well as the use of local knowledge, was critical to legitimacy in coastal management partnerships in England.

Baber and Barlett (2002) do a nice job in comparing the theories of John Rawls, Jurgen Habermas, and John Bohman; all of who place public deliberation high on their requirements for legitimate processes. John Rawls (1971) puts public deliberation in a place of prominence when
he speaks about “ideal discourse.” Habermas (1973) emphasizes “social interaction,” and James Bohman (1996) uses the terms “democratic deliberation” and “public deliberation” to describe ideals to strive for. Other authors who argue in favor of broader representation in watershed planning organizations are Kalikoski and Satterfield (2004), Freeman et al (1996), Born and Genskow (2000), Leach and Pelkey (2001), and Imperial (2000).

Two works describe in detail how public participation relates to legitimacy in governance in general, and more specifically to resource management. The first of these is chapter 3 of the Sabatier book written by Trachtenberg and Focht (2005), who state that autonomy is part of procedural legitimacy (process) in that it involves people choosing the rules and the method of representation. These authors compare the relative merits of inclusive participation with another legitimacy component called welfare. Trachtenberg and Focht state, "political systems that increase welfare but limit participation are illegitimate because autonomy is sacrificed." The importance these authors place on inclusive participation is common in the literature.

The second article that explores public participation in depth is one by Wilson and McCay (1998). This article thrusts participation into a place of prominence by classifying legitimacy into two types: democratic legitimacy and participatory legitimacy. Democratic legitimacy is derived from laws passed by elected representatives and the constitution, and is similar to Beetham's "legality" as described in an earlier section on definitions of legitimacy. Participatory legitimacy is not derived from laws and the constitution, but is established via the perspective and input of various participants. As described earlier, we see a distinction between legitimacy of morality and rules, versus a legitimacy determined by public acceptance. Wilson and McCay are like many authors who see public participation as an important ingredient of this latter type of legitimacy. It should be noted that rarely have I encountered discussion of the
democratic type of legitimacy as outlined by Beetham when researching articles on natural resource collaboration. Sabatier et al (2005), however, did express concern regarding the collaborative approach's tendency to involve very few elected representatives in watershed partnership activities.

While many theorists advocate for increased public involvement in resource management processes based on moral or legitimacy grounds, there is some disagreement regarding the effectiveness of resource management organizations heavily impacted by public input. Shuett, Selin, and Carr (2001) agree with Smith, McDonough, and Mang (1999) that “more and better public participation is needed to resolve resource management issues.” Other authors stressing the importance of broad representation in natural resource collaborations are Cestero (1999), Grimble and Chan (1995), and Sample et al (1995). Webler and Tuler (2001) emphasized that a good planning process is legitimate if it includes public participation, and that all stakeholders should be involved. However, the majority of survey respondents agreed that the public need not be involved in technical issues. On the other hand, Gutrich et al. (2005) concluded that science can foster the sustainability of public processes in ecosystem management. Differing opinions regarding the role of the public in framing and evaluating scientific issues in a watershed will be discussed in greater detail in another section on the role of science versus the use of public knowledge.

In water resource management the call for greater public involvement has also been advocated through the paradigm of Integrated Water Resources Management (IWRM). Mitchell and Hollick (1993) call for a “bottom up meets top down approach” that requires significant public input. Public participation is more often seen as critical to watershed planning efforts, especially when addressing difficult problems such as non-point source pollution (Durham and
Brown 1998). Government agencies assigned to water management tasks, such as the EPA, have started to mandate public participation as a necessary ingredient of their planning efforts. President Bill Clinton’s 1998 Clean Water Action Plan explicitly promoted the use of the collaborative watershed approach nationwide (Michaels 2001). On a global scale, The Stockholm 2002 principle states that “Water users must be involved in the governance of water resources.” The Dublin principle likewise calls for an IWRM process that coordinates water in an “equitable manner.” It is argued that equity will not be accomplished if only government agencies and large economic interests are accommodated. Lubell (2004) argued that “grassroots stakeholders,” or the people who use the natural resources, must be included into the process and plans of any watershed group if it hopes to be successful.

There are drawbacks to inclusive participation, however, according to some researchers. Many of the same theorists who advocate for greater public participation in resource management at the same time warn about problems resulting from greater inclusiveness. Webler and Renn (1995) bring up the possibility of "prolonged" outcomes due to the large number of participants. Jentoft is similar to Webler and Renn in that he argues for the merits of increased public participation, while warning about the problems such a model of participation can create. Jentoft (2000) refers to a process dominated by interest group participation as one consisting of “more autonomy.” This autonomy is seen from the perspective of interest-group stakeholders because the greater inclusion of public concerns will only detract from the autonomy of these interest groups. Jentoft describes public participation as an asset, but decision-makers have “less autonomy” to implement plans than they would in a process containing fewer stakeholders. In other words, greater inclusiveness may lead to inaction or lack of project implementation. Sabatier et al (2005) mention that landowners sometimes decry greater inclusiveness in
watershed collaboration as a violation of property rights. Kalikoski and Satterfeld (2004) espoused wider public participation, but found that such public participation could be thwarted by legal mandates. Despite the potential problems inherent with involving the public in environmental decision-making, the trend in the future is for greater public participation as authors such as Cortner and Moote (1994) have pointed out.

So far, I have described participation from Fletchers' concept of inclusiveness; both with regard to interest groups and the general public. The desire to broaden participation, however, is supplemented by the desire to have fair and legitimate representation. This relates to Fletcher's second concept of participation --- quality of representation. Democracies generally rely on representation to facilitate a fair deliberation process. In these cases, there can be some differences about the type of representation desired. Earlier I reviewed a study of fisheries management in the Atlantic Ocean by Wilson and McCay (1998), in which they explained the differences between democratic and participatory legitimacy. These authors also differentiated between two different types of participation: “legitimate representation” which refers to the legitimacy of group spokespersons, and “participatory legitimacy” which refers to the legitimacy of overall participation based on inclusiveness. Whereas participatory legitimacy is concerned with fostering inclusive participation, legitimate representation examines the issue of who should be the representative for various groups. Legitimate representation is therefore focused on the "quality" or representation as outline by Fletcher (2003). Lack of quality representation can complicate discourse and threaten legitimacy, just as exclusionary participation can. For example, Kalikoski and Satterfeld (2004) studied fisheries co-management in Brazil and found that legitimate representation was at risk because many fishers felt the personal agenda of some representatives took precedence over the welfare of the entire group. According to Wilson and
McCay and many other authors, both types of participation are required for legitimacy. Legitimacy of participation is therefore determined both by the inclusiveness of participation, as well as the quality of representation.

Regarding the representation aspect of participation, Nikolic and Koontz (2005), in their work on government involvement in watershed collaborations, define legitimacy as the "degree to which the organization is viewed as representative of the community." Sabatier et al. (2005) also lists representation as important to their concept of procedural legitimacy (process), and state that participants in watershed collaborations must appropriately represent the full range of nongovernmental stakeholders. Such representation falls under one of their three basic tenants of legitimacy: autonomy (the other two being welfare and justice). Such autonomy is relevant to the concept of consent, which can be based on “hypothetical consent” or representation (Sabatier 2005). Sabatier and his colleagues consider representation legitimate as long as it is an open process for participation, and they do not necessarily believe all members of society need be involved. In this way they are okay with the heavily volunteer-based nature of many watershed councils, as long as the representation is in “proportion to their size and intensity of interests (Sabatier 2005).”

Unfortunately, all too often the make-up of watershed planning groups is not representative of all stakeholders in the region. Adams (2005, 550) found that representation for the watershed planning group in the Cache River of Southern Illinois was heavily weighted towards a class of property-owning farmers, and “no African-Americans, no non-farming professionals, nor other members of the larger community participated.” Some studies also indicated that getting a diverse representation of all socio-economic groups is a difficult task that requires different methods and strategies depending on the context of the situation (Webler and
Tuler 2001). In Chapter 5 of *Swimming Upstream* (2005), Samuelson and others studied citizen participation in watershed collaborations in the San Antonio area of Texas. They found that those who actively participated in watershed groups tended to be white males with advanced college degrees, who also scored high on an index measuring concern for the environment. Wallington in Australia (Wallington, Lawrence, and Loechel 2008) and Sabatier et al. (2005) in the United States both found that those with greater resources tend to be over-represented in watershed collaboration, threatening the legitimacy of this type of resource governance.

Related to this lack of diversity in representation in watershed collaborations is the conflict between the two types of representation discussed above: interest group (stakeholder) and the public. The most diverse forms of participation will include all interest groups in addition to the general public. Many of the problems associated with attaining public input were described above. In addition to these problems, including Jentoft’s concepts of more autonomy (interest groups have more power to implement plans) and less autonomy (greater public participation that can retard action by interest groups), there are other authors who have discussed the trade-offs and issues related to stakeholder participation versus public participation. Renn, in his book *Fairness and Compensation in Citizen Participation* (1995), referred to this struggle as one of affected interests versus objective analysis. Bohman (1996) talked about interest group pluralism as a positive force, but only if all participants have input into the process. Wilson and McCay (1998) compared communication versus credible influence in their study of participation in the mid-Atlantic fisheries industry. Sabine O’Hara (1996) noted the importance of negotiation in solving natural resource conflicts. Fletcher (2003) used the term "structural representation" to describe the opportunities that stakeholders have for participating in the decision-making process. Fletcher also listed several elements that are crucial for fair and
effective stakeholder representation: (1) identifying the stakeholders, (2) determining who can participate, (3) setting up the specific membership for the steering committees, and (4) making sure that the membership profile resemble the wider stakeholder profile. O'Riordan and Ward (1996) found that a "participatory approach" that was inclusive of all stakeholders, including the general public, was the best way to go when managing shorelines in England. Trachtenberg and Focht (2005), felt that watershed organization participants must "appropriately represent the full range of nongovernmental stakeholders" in order to achieve the "hypothetical consent" required of procedural legitimacy in a democracy. Webler and Tuler's survey of watershed participants in Massachusetts found that there was almost universal agreement with the ideas that all stakeholders should be involved in watershed planning, no matter how difficult they may be, and that public participation was considered a requirement for legitimacy in watershed partnerships. Finally, it is important to note that all three of the theoretical frameworks studied in chapter 6 of Swimming Upstream (Sabatier et al. 2005) -- Institutional Rational Choice (IRC), Social Capital Framework (SCF), and Advocacy Coalition Framework (ACF) -- depended heavily upon widespread stakeholder representation and public involvement in order to be effective models of resource management participation.

2. Justice, Fairness, and Equity

Justice, fairness, and equity cross over into both process and outcome, because a fair process should result in an outcome where justice and equity prevail. The need for fairness, justice, and equity is a key for greater public participation in the environmental decision-making process. Equitable distribution of costs and benefits cannot be met if the process is not

Susan Hanna in her study of Pacific fisheries (1995) used the term "equity" to describe a situation whereby costs and benefits are distributed fairly among all participants. In her scenario, equity is dependent on representation, process clarity (transparency), compatible expectations (between participants and process), and distributional implications (fairness). Brown and Corbera (2003) also discussed equity in institutions and decision-making, in their article dealing with a new carbon economy for addressing climate change. Brown and Corbera saw equity as determined by three elements: participation, inclusion, and negotiation of competing views. They believed that, "The impacts will be conditioned and partially determined by access and decision-making, but are primarily about who gains and who loses in terms of the distribution of project costs and benefits."

Related to equity and fairness is the often overlooked idea of social justice. Many theorists have identified social justice as something all participants should seek in creating a legitimate process. As with many of the concepts discussed here, the term social justice has various synonyms used by different authors. Among the terms that describe social justice are Webler and Renn's (1995) idea of political equality, Sabine O'Hara's discoursive ethics (1996)
which emphasizes "concern for the rights of all," and Doremus and Tarlock's (2003) idea of "social vision of the future landscape." Other authors who allude to justice are O'Riordan and Ward (1997) and their description of "distribution of power," Habermas (1973) and his reference to "individual liberty," Bohman's (1996) focus on an egalitarian society, Fishkin's study of ethical issues, and Held's (1987) emphasis on the need to eliminate "inequalities."

It is John Rawls in his book *A Theory of Justice* (1971), who places a premium on this concept of justice. Rawls talks about justice and equality when he outlines his vision of the ideal discourse. Any discourse that ignores justice is less than ideal and therefore non-legitimate. Furthermore, any outcomes that do not address concerns for social justice are non-legitimate. Central to Rawl's idea of justice is the concept of equality. No group or individual should have special powers or access to information (Baber and Bartlett 2002). Rawl's veil of ignorance goes further, and removes the perception of any positions of power from the minds of the participants who are ignorant of their position in life. Such a democratic and egalitarian framework necessarily facilitates a just outcome.

Justice and fairness not only overlap between process and outcome, but they are strongly related to one of the major foci of this dissertation -- legitimate participation. Fair processes and outcomes are contingent upon all stakeholders being represented in planning activities. The study in the Cache River watershed in Southern Illinois mentioned above, found that while a general consensus was reached about plans, the major decision-makers on the planning committee were a homogenous group heavily dominated by traditional farmers (non-conservation) and selected by the local Soil and Water Conservation District. This same study showed that many residents did not consider this type of committee-structure legitimate (Klauser 2004).
The needs of future generations are also cited frequently as corollaries to the concepts of justice, equality and fairness. Rawls asserts the need for “cooperation of generations” in his book, *Theory of Justice* (1971). In "Constitutional Law and Environmental Policy" (2003) Holly Doremus writes about the importance of considering future generations in planning outcomes. In another work on the controversy in the Klamath River in 2001 (Doremus and Tarlock) a focus is placed on the "future vision of the social landscape." Firey (1960) wrote that resources will be more effectively used for the public good if the needs of future generations are taken into account, and Mikaslen and Jentoft (2003) include the interests of future generations in their call for a broader, more democratic type of participation in fisheries management in the Atlantic.

Many environmental groups such as the Sierra Club argue that they are the proper representatives of future generations. However, national environmental groups have complained that it is difficult to be represented in many local partnerships. In a classic commentary by the national leader of the Sierra Club, it was pointed out that urban interests located far from the focal point of the watershed planning group are often unrepresented (McCloskey 1996). Instead, local interests often dominate over national and environmental concerns in many watershed groups.

3. **Trust**

Trust can be considered part of both process and outcome legitimacy because it works to increase the quality of outcomes, and yet is also an outgrowth of a good process. Many argue that a legitimate process will develop trust between stakeholders, which further legitimizes the planning process. Putnam, in his classic book *Bowling Alone* (1995), referred to this process as
building “social capital.” Many researchers concerned with legitimate planning processes, such as Jules Pretty and Hugh Ward, have emphasized the need for social capital (Pretty and Ward 2001), and define it as comprising relations of “trust, reciprocity, common rules, norms and sanctions.” Trust is therefore a requirement of a legitimate process, but is at the same time an end result or outcome of such a process.

The enhancement of social capital is often targeted as a desirable outcome from watershed collaborations. This social capital was referred to as “social outputs” in a recent study by Hardy (2010) where it was differentiated from “environmental outputs.” Environmental outputs are now just being studied by some scientists (Koontz and Thomas 2006; Thomas 2008), but are still much more difficult to measure due to the short time span of most watershed groups and the shortage of baseline water quality data. Hardy’s social outputs are based on “increasing community trust, network building, group development, and increasing legitimacy for taking action (Hardy 2010).” Examples of social outputs in one of nine watersheds studied by Hardy included comprehensive plans for guiding new developments, education of local officials and landowners, and collaboration with developers on land conservation. All of these types of trust-building activities would fall under the outcome category of legitimacy, but would necessarily improve the process as well, thus illustrating the interrelationships between legitimacy process and outcome.

O'Riordan and Ward (1997) wrote the article "Building Trust in Shoreline Management: Creating Participatory Consultation in Shoreline Management Plans," which concluded that the implementing agency was dependent upon the "goodwill of participants." The authors also argue in favor of creating trust at an early stage in order to reduce long-term costs of participatory management --- something they referred to as "efficiency gains." It was recommended that trust
be developed via a process of fair play and finding compromises in order to achieve consensus. O'Riordan and Ward felt that trust was a key component of participatory resource management because there would always be winners and losers in any outcome, and all stakeholders needed something to encourage their future participation in the process. Hirschman (1970) used the term "voice" to refer to the input that potential losers have in governance, and as long as trust was maintained so too would their voice be heard. On the other hand, if trust was not preserved then losers would "exit" the process, and thus legitimacy would eventually be undermined.

In Webler and Tuler's study (2001) one of the four views classified from participants in the watershed planning field was named "Educating People and Constructing Dialogue." Although heavily dependent on the elements of education and transparency, another key aspect of this factor was the idea of trust. Trust and respect between stakeholders were cited as important drivers in achieving "quality talk" and "rich dialogue," both of which facilitated the goals of this view. Wilson and McCay (1998) categorized different types of participation in their work on fisheries management, and a lack of trust (distrust) was seen as arising from the contradiction between "mobilization, or industry mobilizing to achieve its agenda," and "sources of accountability, or participation resulting from forcing people to be accountable." Developing trust in the planning process was mentioned as one way to negate the conflict between these two types of participants.

Trust is commonly cited as an important factor in fostering successful resource management collaborations. Schuett, Selin, and Carr (2001) looked at 30 collaborative resource management initiatives and found that "trust, respect, and honesty" were largely responsible for effective team building and the development of good stakeholder relationships. Genskow and Born studied overlapping time frames and institutions in watershed management in a recent
article (2006) and noted how social capital and trust could improve or diminish over time, and thus spell success or failure for partnerships. Leach, Pelkey, and Sabatier (2002) conducted a comprehensive study of watershed management organizations in Washington and California, and also concluded that trust and social capital were one of several keys in determining their eventual success. An earlier study by Leach and Pelkey (2001) that relied on a literature review came to a similar conclusion regarding the importance of trust, but this article also stated that there were other factors that were "precursors" to developing this concept. Among these were a neutral facilitator, clear process rules, and unimpaired sharing of data and information. This illustrates the point that trust is not only part of a legitimate process and outcome, but also helps to develop, and is in turn dependent on, other elements of legitimacy such as information exchange, fair deliberations, inclusive participation, respect, equity, and justice.

Inclusive participation is often held up as a facilitator of trust in watershed partnerships because everybody feels they are part of the process, but what about the reverse relationship? In other words, how does increased or decreased trust affect participation in such organizations? In chapter four of the Sabatier book (2005), Tracht and Fochtenberg investigated how trust impacted participation rates in the contentious Illinois River watershed in Oklahoma. They found, surprisingly to some, that increased levels of trust actually decreased rates of participation, whereas lack of trust was associated with greater participation. The authors attributed this to the need to protect one's interests by getting involved when the present participants are perceived to be untrustworthy or seem only interested in advancing their own personal agendas.

Focht and Trachtenberg (2005) also differentiated between stakeholder or "social trust," and trust of governmental officials or "official trust." They discovered a complex relationship in the Illinois River watershed of Oklahoma, in that different stakeholders had higher or lower
levels of trust of both government officials and other stakeholders depending on the individual. These authors were able to correlate different participation strategies with levels of trust for these two groups. When both levels of trust were high a "confirmation strategy" was recommended, whereby government officials would make policies based on what they believe stakeholders want. The stakeholders would then simply need to "confirm" these policies. If there was a high level of social trust but a low level of official trust, then a "consultation" strategy of participation was considered the best option, with all stakeholders negotiating from the beginning and the government consulting with them in all phases of the process. If official trust was high and social trust low, then government officials would be called on to facilitate negotiations between stakeholders in a strategy known as "facilitation." When both types of trust are lacking, the authors argued for a "negotiation" strategy which involved the use of outside facilitators who would utilize a recursive process to enhance trust while addressing stakeholder concerns and issues. Focht and Trachtenberg believed that if the wrong participation strategy was used then the effectiveness of watershed management could be negatively affected. Another study from this same watershed (Meo 2007) concluded that stakeholders trusted other stakeholders or independent experts more than they trusted the governmental agencies involved in watershed collaboration, invoking the need for a "consultation" strategy as described by Focht and Trachtenberg (2005).

In chapter 8 of *Swimming Upstream* Leach and Sabatier (2005) attempt to answer the question, "Are trust and social capital the keys to success of watershed collaborations?" First, they define trust as "knowing that one's fellow stakeholders are likely to negotiate honestly, are worthy of respect, and sufficiently honorable and competent to keep any promises they keep." It is interesting to note that unlike some authors, they see trust and social capital as separate entities,
rather than the former being part of the latter. The norms of reciprocity (one should return favors) and social networks as described by Putnam and Coleman (1988) make up a definition of social capital that is similar to, but distinctly different than trust. Leach and Sabatier agree with many authors cited in this paper who see trust and social capital going hand-in-hand with watershed partnership success. Many believe that relationships built through collaborative activities lead to greater trust and eventually the achievement of environmental goals (Brasier 2011). Leach and Sabatier, however, wanted to establish cause and effect. They asked, "Did trust and social capital lead to success, or did success lead to trust and social capital?" In order to answer that question they used trust and social capital as both dependent and independent variables for a regression analysis of survey data.

Using a random sample of 47 watersheds out of a pool of 150 in Washington and California, Leach and Sabatier were able to conduct 1625 surveys and 315 interviews. Three factors were used as a measure of watershed partnership success: (1) agreements, (2) completion of restoration projects, and (3) perceived impacts on the watershed. The third measure of success was similar to my research in that it relied on perceptions of success rather than physical monitoring, the latter of which is very problematic in watersheds due to a troubling absence of base-line and long-term post-project water quality data. Trust was one of several independent variables tested in this study using OLS (Ordinary Least Squares) regression. The goal was to determine which factors had the greatest influence on the three measurements of success, with a particular emphasis on trust and social capital. In many other studies I read, trust was treated as one component of social capital but the authors here treat them separately, albeit related. The regression was also turned around with trust as the dependent variable and the effect of other variables tested on it.
It was found that both trust and social capital had significant correlations with agreements but not with restoration projects, except for the fact that such agreements were necessary before restoration could proceed. The regression model also showed that trust, as well as social capital, would "induce stakeholders to evaluate their partnerships more positively." However, using scatterplots comparing trust and agreements the authors found that for partnerships younger than 36 months the correlation between the two factors was actually negative. Further analysis showed that some young partnerships achieved agreements despite a lack of trust, due to the existence of some crisis situation that demanded immediate action. The authors concluded trust was a key factor in getting agreements in "older" partnerships, but that achieving such agreements in younger partnerships could occur absent such trust in the right context --- namely a crisis situation. Examples of this would be watershed plagued by extreme flooding hazards or allocation conflict caused by droughts and overuse. Trust as a dependent variable was found to be affected by a belief in a fair process, suggesting to the authors that fairness was a key ingredient for trust in watershed management.

4. Transparency and Access to Information

Collaborative or community-based environmental management is tied to democratic governance. Transparency is often mentioned among theorists as a key element of legitimacy in democratic decision-making. The idea of transparency has near universal acceptance with regards to its role and impact on the legitimizing process. In the literature I found a great deal of acceptance of transparency as a requirement for legitimacy. No matter what type of participation
exists, a necessary requirement for legitimacy is open and equal access to information. This concept of equal access to information fits into the ideas of equality discussed above.

Doremus and Tarlock (2003) both cited the need for transparency in a legitimate decision-making process. Jurgen Habermas (1973) also used the term transparency while Bohman (1996) talked about "equal access to science." Wilson and McCay (1998) stressed the need for "transparency" and "open communication" in their paper on participant communications in the fishery industry, and O'Riordan and Ward (1997) talked of "information" as being critical to good governance. They stated that not only must the process be open and accessible in order to build trust, but information exchange within local networks is critical to the "consultative process." These networks of information are the basis of empowerment and are useful in formulating positions and for mutual education. Sabine O'Hara (1996) wrote of the need for "authentic debate" while Webler and Renn (1995) also called for a transparent process. Rawl's (1971) ideal discourse depended on equality and no special interests, while Sekher (2001) outlined the benefits of democratic deliberation. Held (1987) pointed out the value of democracy, Luhman (1990) wrote of an "open system," and Dryzek (1987) mentioned public debate and transparency as critical elements of his "rational ecology." Robertson and Nielson-Pincus (2009) concluded that “Watershed groups should engage in activities that foster open and candid communication between group members and increase the leadership and technical capacity of its members.”

Because accountability depends partly on transparency, the two are naturally closely related. Fletcher (2003) argued that a transparent relationship between the representatives and their constituency provides for accountability. Mikalsen and Jentoft (2003) hail transparency, along with stakeholder involvement, as the core values of the "ideal” management structure.
Hanna (1995) described the need for good information transmission between participants as a precursor to effective fisheries management. She listed "process clarity" as one of the four requirements of equity in the governance of natural resources. Harte (2001) found that "open communication" was necessary for legitimate fisheries management in New Zealand. Rothstein (1998) supported the idea of transparency by calling for "democratic representation" in his politician-oriented model of government. According to Jentoft (2004), lack of communication can often lead to confusion and the breaking of rules because managers are not getting their message out. This is especially true in fisheries management where rules are complex, and Jentoft stated that "Neither penalties nor moral condemnation will do the job then. Rather, more effective communication is the answer." Accountability will be discussed further in a section below.

The push for transparency extends to government agencies such as the U.S. Environmental Protection Agency which lists transparency --- along with clarity, consistency, and reasonableness --- as one of four required criteria for effective communication in ecological risk characterization (U.S. EPA 1999). The EPA relies upon transparency to make the process open and frank, which in turn leads to full disclosure of assumptions and uncertainties and the identification of policy-driven assumptions. A need to separate science from policy, and the acknowledgement of conflicting scientific interpretation, is also advocated. Describing the level of confidence in major risk conclusions is also considered part of the transparency issue for ecological risk assessment in watersheds (U.S. EPA 1999).
5. **Education and Outreach**

Related to the need for efficient exchange of information and a transparent process are education and outreach strategies. Born and Genskow (2001) did a detailed analysis of four watershed groups in different areas of the United States, and determined that effective education and "awareness programs" contributed greatly to the success of all four partnerships. Included in their results was the need to facilitate public education on key watershed issues. Agenda 21 was an outgrowth of the 1992 Rio Summit on sustainability and was initiated to foster local governance of natural resources. Freeman et al (1996) investigated local government models from this "Local Agenda" movement and concluded that shared information and education were important elements required for effective collaboration of resources. According to Kenney's (2000) study of watershed groups in the western United States, education of both participants and the public was an essential ingredient for the "success" of such collaborations. Webler and Tuler (2001) used Q methodology to categorize articles on public participation in watershed partnerships into one of four categories. The category titled "Educating People and Constructive Dialogue," depended heavily on transparency and information exchange, as well as an effective outreach campaign.

Earlier I mentioned Lubell’s (2004) concept of “grassroots stakeholders” in the section on inclusive representation. Because these are the stakeholders who use the resource, the main goal of natural resource collaborations is to change the behavior and attitudes of these “consumers” of the resource. Lubell states, “The immediate cause of most environmental problems are the resource decisions of grassroots stakeholders – how much they take from the environment, using what technologies, and the amount and nature of substances they put back into the environment.”
Public outreach campaigns are often used by watershed collaborations to change the attitudes and behaviors of these resource users in an attempt to avoid degradation and depletion of the valuable resources in the basin. Ostrom (1990) called these users of natural resources -- be they farmers, fishers, irrigators, or loggers - - the “appropriators.”

Unfortunately, very little research has been done on the premise that outreach and education in watershed collaborations will lead to changes in the behavior of resource users. One recent study did investigate the adoption of agricultural best management practices (BMP) in collaborative and non-collaborative settings. Campbell, Koontz, and Bonnell (2011) did a study of BMP adoption by farmers in two watersheds in Ohio; one using the traditional agency approach to eliciting adoption of conservation methods and one using the watershed collaborative approach. The results of this study were mixed, with the watershed using the traditional approach getting similar rates of BMP adoption as the watershed using the collaborative approach. However, in the collaborative-based watershed they found participation in BMPs was greater for those landowners who participated in the collaborative process than those landowners in the same watershed who did not participate. It should be noted that a regulatory approach was not tested in this study, but rather only two methods of garnishing voluntary compliance. How such a regulatory alternative would fare against these two voluntary approaches is an important question to contemplate, but unfortunately there are few regulatory mechanisms that deal with non-point source pollution at the present time.

6. Conflict Resolution and Consensus

In order to achieve the goal of inclusive and diverse stakeholder participation, which many authors describe as being critical for the legitimacy of watershed management
organizations, a method for dealing with inevitable conflicts between these groups must be found. The existence of competing interest groups will require effective conflict resolution. Harte (2001), Doremus (2003), Tarlock (2003), and Bohman (2002) stressed the importance of conflict resolution in attaining legitimate outcomes.

However, the important question for conflict resolution in natural resource management is whether consensus is a necessary or even desirable goal? Collaborative-watershed management is often driven by the need for consensus as a means of dealing with conflict resolution. Some authors equate collaborative watershed management and consensus as synonymous (Brasier 2011). Imperial and Hennessey, in their comprehensive work on watershed governance (2000), identify consensus as a “measure of success” for bottom-up-driven, watershed collaborations. Consensus is also discussed in great detail by theorists studying democratic processes, and it has huge implications for achieving legitimacy in decision-making. Environmental decision-making is no exception in this regard. The very success of community-based watershed partnerships is often described as being highly dependent on the achievement of consensus (Leach and Pelkey 2001; Leach, Pelkey, and Sabatier 2002; Margerum and Hooper 2001; Schuett, Selin and Carr 2001; Margerum 1999).

Despite the fact that natural resource collaboration is often seen as consensus-based decision-making, many scholars question the wisdom of relying on this type of decision-making model. In fact, consensus was the most critical point of divergence discovered in the literature with regard to the legitimacy of environmental decision-making. As with legitimacy, simply defining the term can be problematic. One dictionary definition states that consensus is “an opinion held by all or most,” or is “general agreement” (Webster’s New World Dictionary 1991). As Brooke Zanetell pointed out in her article on consensus-based watershed management, many
definitions regarding consensus in watershed management are less specific. In Zanetell’s article, alternative definitions of consensus are presented: including Weber’s (2000) which states that consensus is “defined as general agreement” rather than unanimity,” Kinsley (1997) who states that “consensus doesn’t mean unanimous agreement” - - it means a decision that just about everyone can live with,” and Raymond (1995) who sees consensus as “joining together those with differing positions on an issue to develop mutually acceptable solutions.” Most of the definitions cited here seem to coincide with how the term relates to watershed management -- mainly that consensus rarely means total unanimity. Consensus in the context of watershed partnerships rarely means that partnerships can force stakeholders to act against their will, but rather implies that the partnership as a whole must grant its consent before individual members carry out their legally-mandated activities (Leach, Pelkey, and Sabatier 2002).

Some theorists propose what appear to be alternative versions of consensus that are less strict than the idea of unanimity, and therefore more amenable to stakeholder-driven watershed planning. O’Riordan and Ward (1997) used the phrase “conflict avoidance” to describe their “ideal outcome.” Consensus is pursued, but there are disagreements regarding the attainability of such a goal. Hirschman (1970) instead talked about “voice” as an alternative to consensus. If different groups maintain a voice outcomes are sustained, otherwise some may “exit” the process and legitimacy is diminished. Other related ideas can lead to legitimacy according to Renn (1995), Doremus (2003), Harte (2001), and Dryzek (1987), who write about “workable outcomes”, “durable solutions,” “sustainability,” and “rational collective outcomes.”

As mentioned earlier, there is considerable debate regarding the need for consensus in watershed management. Critiques of consensus come from theorists as well as watershed planning researchers. Social theorists disagree with Habermas and others who believe that an
open and fair deliberation process will lead to consensus, as well as a “rational outcome” and instead argue that democratic discourse is not likely to lead to consensus and thus the possibility that chaos and division can occur instead (Mill 1996). These theorists, led by Riker (1980, 1982), Black (1958), Arrow (1963), and McKelvey (1976), agree with the idea that democratic deliberation in a free and fair manner is good for society, but only due to its countervailing effect on power elites. Social choice theorists believe that democracy can often lead to irrational and unstable outcomes rather than consensus. Social choice theorists also see voting as a necessary alternative to consensus (Mill 1996).

The situation is complicated by the need to bargain away rewards and sacrifices due to the unequal nature of these factors within a diverse community of stakeholders. Nickelsburg states that “a bargaining problem is implicit in every collective action committee.” This situation makes Habermas’ call to resolve conflicts through more discourse very problematic. Rothstein (1998) noted that problems often arise when all participants are not playing by the same rules or following the same norms of behavior.

Research in watershed planning and other natural resource collaborations has uncovered other problems associated with consensus decision-making. Many critics go so far as to reject consensus as unnecessary and even counterproductive in resource management and environmental decision-making. A rush towards consensus often excludes some stakeholders, and thus the goal of joining together of those with differing positions is left unattained. One of the main foci of this research paper will be on the natural dichotomy between the need for inclusive stakeholder participation and the desire to achieve consensus. It seems obvious that the more diverse stakeholder participation becomes, the more difficult it will be to achieve consensus. The danger will always exist, therefore, that a move towards consensus will result in
the exclusion of some stakeholders within the watershed, thereby threatening the legitimacy of both process and plan (Mill 2006). In the Cache River study mentioned earlier, for example, a general consensus was reached on plans but the inclusiveness of the entire process was suspect (Klauser 2004).

Another stated problem with the consensus approach is the tendency for partnerships to steer away from critical but controversial issues, and focus instead on less important problems where an agreement for action is easier to obtain (Leach and Pelkey 2001). This has been referred to as the “least common denominator” problem and can lead to ineffective planning efforts (Coglianese 1999; Kenney 2000; Koontz et al. 2004). Also, achieving consensus can take a long time which often leads to delays in dealing with salient issues within the watershed (Leach and Pelkey 2001). Gray (1989) stated that even when consensus is attained for general goals and strategies, the emergence of specific goals may threaten such consensus. Innis (1994) concluded that consensus is easier to reach on general goals, but agreements can fall apart when more specific and binding courses of action are proposed.

Amy (1983) warned about the potential that environmental groups and less powerful interests can be “co-opted” by more powerful concerns. Wilson and Wettman (2000) argued that watershed collaborations are particularly vulnerable to this type of co-optation and state, “The reality is that companies are more likely to have both the time and the expertise to participate in stream teams, habitat conservation plans, and the like.” Some researchers (Peterson et al. 2005; Britell 2007) distrust consensus-based models because of their tendency to favor the status quo, typically economic developers, at the expense of environmental interests. Peterson and others (2005) argued that the argumentative model of decision-making was better for conservation efforts than one utilizing a consensus model. They believe that the well-entrenched economic
interests wielding veto power can effectively kill any efforts to increase environmental protection (Peterson et al. 2005). Marc Reisner expressed a concern that consensus may replace environmental management as the ultimate goal of watershed collaborations (1999).

Margerum and Hooper (2001) emphasized the need for consensus for primary objectives and strategies, but stated that such consensus “does not guarantee public and political support.” The conclusions of a limited number of participants may not coincide with the views of spokespersons’ constituents or the general public. This problem only belies the need for “legitimate representation” and greater public involvement in the process, as described earlier. Margerum and Hooper also pointed out that consensus building does not stop with implementation, and that ongoing discourse between stakeholders will be necessary throughout the process as conditions and relationships change.

Even when consensus is reached, it is debatable if cooperation between the various affected stakeholders will increase. Lubell (2004) concluded that participants in coastal watershed groups who used the consensus approach of the U.S. EPA’s National Estuary Program (NEP) did not cooperate any better with fellow stakeholders than those groups who did not use the NEP model. My study of watershed groups will examine some of these possible problems and their impact on legitimacy, as well as critical issues regarding representation.

7. Accountability

Because collaborative watershed organizations rely so much on voluntary compliance for plans and outcomes in the watershed, it is very important for accountability to exist in some form within these groups. What should the source of accountability be for collaborative based groups?
In Australia, Wallington, Lawrence and Loechel (2008) saw government as the only viable entity for achieving accountability for watershed partnerships in a democratic society. They described a hybrid approach to governing watersheds known as "metagovernance," and stated that collaborations within Australia are best when they operate within some sphere of hierarchical rule. In addition, they perceived this metagovernance arrangement as one of power sharing between state and non-state actors, with the state maintaining ultimate accountability in a combination of the old and the new ways of managing water resources.

Others who stressed the importance of accountability were Freeman et al. (1996) in their study of the Local Agenda movement, Beetham (1995) in his book on legitimacy and power, Kalokoski and Satterfeld (2004) in their work on fisheries co-management in Brazil, and Nielson et al. (2004) and their review of fisheries governance in Asia. Wilson and McCay classified fisheries participation into three different categories, one of which was "source of accountability," which saw industry participation as a reason for getting involved in co-management.

Wallington, Lawrence and Loechel (2008) also linked the concept of accountability to the element of representation. They concluded that lack of citizen involvement, as well as representation along a narrow range of interests, created problems of "public accountability." Collaborations were formed between NGO's, business, and state government without the direct participation of the wider citizenry, thus eliminating the link between public participation and accountability. Those interviewed in their study communicated worries about the use of public money in watershed groups that did not have any real accountability to the wider community, something common in U.S. partnerships as well. The authors cited their concerns about the absence of public participation as a form of accountability. They stated, "A reliance on the
involvement of stakeholders as 'representative' of the range of interests, the assumption that their engagement is citizen empowering is proving to be flawed (Wallington, Lawrence and Loechel 2008)."

Accountability often naturally is linked to the role of government, particularly with regard to regulation. Even though the collaborative approach relies heavily on voluntary compliance, some studies tout the benefits of governmental regulation. Sometimes such regulation forms a mandate for action for natural resource collaboration, such as was the case in the Rogue River Basin of Oregon where the Northwest Forest Plan provided a framework for the installation of basin-wide plans (Margerum and Whitall 2004). It has also been suggested that state and federal regulations can foster the goals and interests of the nation as a whole in cases where the watershed groups may otherwise act entirely upon local problems only (Land and McDonald, 2009). In these situations state and federal regulations can foster some form of accountability at the larger scale. According to a recent study (Robertson and Nielson-Pincus 2009) this can “prevent local groups from acting entirely out of self-interest at the expense of broader public or national interests.” On the other hand, watershed groups driven by regulations often encounter greater conflicts among different stakeholders (Borisova, Racevskis, and Kipp 2011).

8. Role of Science: The Scientific Experts vs. Local Knowledge

The role of science versus place-based, local knowledge is part of the legitimacy debate that is related to the concept of scale. Science is an integral component of the traditional paradigm associated with agency-driven, top-down resource management, whereas local
knowledge is advocated by proponents of place-based collaborations as a means to legitimize the planning process. Weible, Sabatier, and Lubell (2004) outlined two distinct approaches for risk-based, decision-making over the last 25 years that correspond to these paradigms. The older approach was developed in 1983 by the National Research Council (NRC) and is known as the linear scientific approach. This approach uses a team of scientists to develop a plan, and later the public is solicited for their input. The newer paradigm was developed in 1996 and is known as the analytic and deliberative approach. It involves a diverse set of stakeholders who along with scientific experts provide a range of recommendations using the collaborative process (Weible, Sabatier, and Lubell 2004).

Wieble and his colleagues studied stakeholder preferences for these two approaches based on their core beliefs. It was found that stakeholders with strong preferences for scientific management favored using the Scientific Linear, or empirical approach, rather than the analytic and deliberative approach. On the other hand, it was discovered that those who respected local knowledge more than scientific experts favored the analytic and deliberative approach (Weible, Sabatier and Lubell 2004). Cheng and Daniels (2002) referred to such local knowledge as “stakeholder ways of knowing” and they also described its relationship to scale. For these reasons, it is a good idea to examine the issue of scale as it relates to stakeholder beliefs regarding scientific experts versus local knowledge, as Weible and his colleagues did in their study of marine protected areas in California (2004). In this study, I expected smaller watersheds to have a greater focus on local, or place-based knowledge, rather than on the traditional use of science. The opposite should also be true for the larger watersheds in the study.

Many environmental decisions are based largely on scientific information, and the expertise of knowledgeable academicians and agency personnel is typically critical. Democratic
theorists generally relegate science to an advisory role, and stress that discourse and value-deliberations are necessary in determining actions in environmental settings (Rawls 1971; Doremus and Tarlock 2003). They state a need for stakeholder and public evaluation of science and information, typified by Sabine O’Hara’s (1996) call for “combining scientific rationalities to stakeholder biases.” In these cases of public-science interaction, there is a requirement for what theorist John Bohman (1996) calls “equal access to science.”

Some scholars note the need to balance the role of science against the local, place-based knowledge stressed within the new watershed paradigm. Wallington, Lawrence, and Loechel (2008) called "epistemic legitimacy," or the role of experts and science, the "dominant line" in natural resource management. Basing their definition of epistemic legitimacy on O'Neill (2001) who called it "knowledge, expertise, or judgment that allows an individual to speak on behalf of some group," Wallington, Lawrence and Loechel expressed legitimacy concerns with the notion that natural scientists and environmental lobbying groups speak for those not present for deliberations, particularly future generations and animals. They believe such representation is flawed as it, "poses problems for legitimacy, because representatives cannot requisite authorization and accountability." Due to these objections, they believe that expert knowledge gains legitimacy where such knowledge is obtained from the deliberations involving all citizens. As such, they agree with other authors who claim that science alone is not the answer, and that a transparent and public debate involving public participation will be required in all cases (Wallington, Lawrence, and Loechel 2008).
The move towards watershed collaboration is often referred to as “place-based” environmental management, and the place generally agreed upon is the watershed. The use of the watershed as a unit of environmental management is not new in United States history, as Sabatier et al. (2005) noted in chapter two of their book. John Wesley Powell advocated the use of watersheds as early as the 1880’s (Lipscomb 2003), and it was later adopted for several large projects such as the Hoover Dam and the Tennessee Valley Authority during the 20th century. What is new is an emphasis on collaborative efforts, as opposed to top-down decision-making from government bureaucrats (Sabatier 2005).

Many authors emphasize the need to base today’s collaborations on watersheds rather than political boundaries. The watershed is a natural unit of analysis in environmental sciences, and there are strong ecological and physical connections between processes on the landscape and those within streams and lakes. The Natural Research Council, in their book *New Strategies for America’s Watersheds* (2003) refer to a “waterscape” which they define as a “combination of the hydrology and topography of the landscape.” The interdisciplinary approach advocated for in the NRC book is commonly found in many publications that argue in favor of “the watershed approach.” Several advantages to the watershed approach are typically described including advantages in balancing competing demands for water, its effectiveness at linking upland and downstream impacts, and reducing the chance that one problem will be solved at the expense of another. In addition, the watershed approach stresses the importance of ground and surface water connections and deals with these two in an integrated fashion, something that has all too often been ignored in the past. In brief, the watershed approach focuses on an integrative,
coordinated approach rather than the “traditional,” single-disciplinary, and single-sector approach of the past.

Single-disciplinary and single agency “fragmentation” is one key problem of the traditional paradigm according to the NRC group (NRC 2003). They note that fragmentation exists with regards to politics (agency fragmentation), academics (single discipline research), and the physical environment (watersheds) -- and all three are threats to the effective governance of water resources. This type of integrative approach has recently been referred to as Integrated Water Resources Management when applied at the river basin scale (Hooper 2005; Margerum, 1999; Margerum and Hooper 2001; Mitchell and Hollick 1993).

There are several major problems noted in the literature regarding the watershed approach, however. The first is that complex political problems do not go away when the watershed is adopted as a unit of planning, as Blomquist and Schlager pointed out in their 2005 article on integrated watershed management. They concluded that decisions on drawing watershed boundaries cannot be divorced from political considerations. Geologists and physical geographers phrase it in terms of scale and topographical contours, but even these decisions are more complex than they appear at first. Decisions about the physical scale are difficult enough, but Blomquist and Schlager point to another important question -- should impacts that occur outside the boundaries of the watershed also be considered in planning activities of watershed groups? In addition, the authors ask if human modifications to channels, wetlands, and lakes be considered part of the entire watershed, along with natural contours and waterways. Their main point is that such decisions are not easy, and are subjected to all the complexities and problems inherent in the political landscape. Furthermore, political boundaries do not go away if the
watershed unit is utilized, and authority within these political boundaries will typically be a significant factor in environmental decision-making.

Another problem related to politics is the relative lack of enforcement power by the new collaborative institutions. A recent study of watershed partnerships in the Philadelphia area found that even in cases where trust and social capital were increased, implementation of plans and enforcement of binding agreements was hampered by the lack of capacity and authority wielded by watershed organizations (Mandora and Paulsen 2011). This indicates that some governmental support may be required for these collaborations to succeed.

Providing possible enforcement powers is not the only way government agencies can affect the success of watershed collaborations. The basin-groups initiated by the Wisconsin Department of Natural Resources (DNR) in the late 1990’s that survived did so mainly as a result of agency support, according to a recent study by Kenneth Genskow (2009). Thus, government participation was crucial to the success of watershed collaborations.

On the other hand, some research has criticized government’s role in watershed partnerships. A study of 29 watershed councils in Oregon concluded that groups with agency affiliations were too heavily influenced by members and did not rely enough on science in its formulation of action plans (Bidwell and Ryan 2006). The authors of this study called for greater stakeholder diversity in the beginning stages of planning to avoid this negative type of agency domination. Another study found that inconsistent or unreliable agency resources, along with inaccessibility of governmental staff, can greatly impair watershed organizations (Lurie and Hibbard 2008).

Besides the political considerations about drawing watershed boundaries, there exists a second problem related to the watershed approach, namely the issue of scale. Tim Loftus
of the Chicago Metropolitan Planning Commission (CMAP) posed an important question, “What is the appropriate scale for collaborative-based watershed planning?” This question is also highly intertwined with political issues, and adds to the inherent complexity common to watershed-based collaborations. Watershed planning on the smaller local scale, often referred to as sub-watershed scale or sub-catchment scale (Hooper 2005) is less complex and easier to implement, but often does not address the entire scope of problems related to the watershed (National Research Council 2003). On the other hand, while river basin scale management is more comprehensive, it is inherently more complex and difficult to implement (National Research Council 2003; Hooper 2005).

The Little Miami Partnership, for example, experienced difficulties implementing management and restoration plant due to the large scale of the watershed (Bonnell and Koontz 2007). A potential solution to this type of problem is the combination of small-scale, group activities with the efforts of larger, basin scale organizations (Robertson and Nielson-Pincus 2009). I will refer to this as the “nested” scale approach and it is something that was used very effectively by all three of the watersheds studied here, which will be described in detail later in this paper.

Therefore, the effect of scale on the legitimacy of watershed planning collaborations will be one of the main foci of the dissertation. Is one scale more legitimate according to the elements of legitimacy as described above? A comparison of larger and smaller scale watershed efforts, as well as nested watersheds within a larger river basin, should shed some light on these questions of legitimacy. Singleton (2002) concluded that the collaborative movement is limited by its ability to resolve core conflicts over equity, which is especially true in nested watersheds and cases concerning migratory resources. In these cases, community control is tested because
the cause and effect of the environmental problems reach beyond local boundaries (Singleton 2002). This harkens back to the question of which issues outside of the boundaries of the watershed should be addressed by the different partnerships (Blomquist and Schlager 2005).

Related to the issue of scale is the role of “shared ownership” in resource management collaborations, especially those that are community-based. Bryan (2004) stated that, “shared ownership is an important concept in public policymaking and cannot be overemphasized.” Watershed management on a large scale can often retard public participation if citizens do not perceive the issues being addressed as salient to their interests. Large-scale watershed management, therefore, can result in a lack of ownership of the watershed and insufficient public representation. Cheng and Daniels (2002) found that this type of shared-ownership is significantly affected by “individual stakeholder ways of knowing,” which in turn is dependent on geographic scale. Warner (2005) believed that “scale can be an impediment from making it interesting,” and that many individuals and groups may “exclude themselves” from participating in water resource management based on scale. Lovell et al. (2002) called for researchers to recognize the “interconnectivity” of scales and the “important constraints, interactions and feedback (lateral flows) that may be associated with such changes in scale.” They focused on the need to link traditional top-down efforts with more recent bottom-up, community-based collaborations, as advocated in Integrated Water Resources Management (IWRM). Conley and Moote (2003) also expressed the need to link local and regional scales. They stated, “Evaluation can also occur at many different scales. At the project level, a watershed council may want to determine whether its members were able to complete a specific stream-restoration project, the council or a third party may evaluate the workings of the council as a whole, while a state agency may choose to assess the combined impact of all the councils it funds.” These “scaling up”
problems (or scaling down if one prefers) are very common in watershed planning and other types of collaborative resource management.

These studies lay out the complexities and issues of scale for watershed planning groups. This is a question that has huge implications from a legitimacy point of view, and will be addressed within the surveys conducted in this research. The answer to the scale question may depend on contextual elements of the watershed, but how these factors help determine the proper scale for watershed management should be revealed by comparing watershed groups operating at the various scales.

(D) Perceptions of Natural Resource Collaborations and Success

One literature source is noteworthy because of its criticisms of the very kind of research being conducted here, so a discussion is warranted. Cary Coglianese’s paper titled “Is Satisfaction Success: Evaluating Public Participation in Regulatory Policymaking” (2002) poses important questions regarding the use of surveys to determine the success of environmental collaborations. The first problem he has with such surveys is the tendency to equate survey satisfaction with the overall success of the planning process and outcome. He believes that policies resulting from natural resource collaborations can turn out to be inefficient, ineffective, and unjust, despite any favorable impressions participants may have towards them. Second, he criticizes the potential bias inherent in such survey samples, which are typically not random, and are usually only getting the opinions of those who are active participants in such groups. In particular, he mentions the poor representation on the part of the general public, and cites a study done by Resources for the Future (Beierle and Konisky 1999) that found for 30 cases of
environmental planning committees in the Great Lakes region, the public was generally not represented in these committees. Third, he brings up the cognitive dissonance issue, which can lure participants into a false impression of success if they have contributed a great deal of time and energy into collaborations, which is typically the case for most natural resource collaborations. Fourth, he believes that perceptions are often erroneous and not supported by empirical data. Fifth, he sees satisfaction as highly affected by irrelevant factors such as the cognitive dissonance factor mentioned earlier, but also by other context related variables that can alter one’s perception of “reality.”

However, the focus of this study is not really on the overall “success” of watershed collaborations but on the identification of potential legitimacy problems, so the arguments made by Coglianese would not apply. In addition, this research is just one small step in evaluating success of watershed partnerships. Identification of legitimacy problems can lead one to question the overall success of the effort, but a legitimate process and outcome may not necessarily equate to effective and efficient outcomes as outlined by Coglianese in his paper. As mentioned earlier, legitimacy is a prerequisite for success, but not the only factor by any means.
CHAPTER 3
OBJECTIVES OF RESEARCH

(A) Exploratory Research and Measuring Perceived Legitimacy

It should be emphasized that this paper is exploratory in nature, and is not designed for making conclusive generalizations about watershed collaborations. Instead, the goal is to uncover legitimacy-related problems and issues related to watershed management organizations and groups. The size of the sample survey, number of focus groups, and the number of watersheds investigated in this study are not large enough to warrant the development of generalizations. Rather, this research will focus on determining what issues should be examined in future work and to generate potential fruitful hypotheses. Some conclusions will be made, however, regarding potential threats to watershed collaborations from legitimacy issues uncovered in this paper. Any problematic areas should be noteworthy because the watershed organizations chosen for study in this paper are some of the most successful in the Midwest. If serious legitimacy threats emerge in these watersheds, this bodes ill for other watershed groups in the region. There are qualitative and quantitative components to my research as described below, but in both cases the overall goal is to identify points of study for future research rather than making broad-based generalizations.

In order to examine issues of legitimacy I needed some measure of this concept, which was a second major goal of this paper. The legitimacy index developed here is a measure of legitimacy based on survey respondent answers to twelve questions dealing with key elements of legitimacy as determined by a review of the literature. It should be noted, however, that the
legitimacy measured here is perceived legitimacy as seen through the eyes of the survey respondents. It is hoped that the legitimacy index will be useful for comparing watersheds, scale, demographic groups, decision-making models (consensus or non-consensus), and other factors regarding perceived legitimacy.

I did not weigh all 12 elements (results from the 12 questions) equally, however, and used two different weighting systems to determine the relative importance of the 12 elements. The Legitimacy Index (LI) used in this research to measure perceived legitimacy by survey respondents utilized two weighting systems that assigned more or less importance (numerical) to various elements of legitimacy. One weighting system was based on survey questions that asked survey respondents to rank the twelve elements of legitimacy. Another weighting system was based on my own evaluation of the relative importance of the elements based on the literature. For this system, I assigned weights based on the importance the literature attached to each of the twelve identified elements of legitimacy. Both weighting methods are subjective and determined by perceptions: survey respondents’ perceptions of the relative importance of the various elements in one case, and by my perception of the literature in the second case. The legitimacy index value (LI) was then determined by calculating the weight for that element times the value given by the survey respondent for that particular element (question). Each survey respondent would thus come up with a different (possibly unique) LI value based on: (1) their subjective view of that legitimacy element’s strength, and (2) the weight (importance to overall legitimacy) for that element. The weight that was multiplied by each element was based on either (1) the importance of each element as determined by ALL the survey respondents or (2) my own subjective view on the importance of each element to overall legitimacy. The LI values for all the elements (strength of element times the weight of the element) were then added to get an
overall legitimacy index for that respondent. The exact procedure for weighting and calculating the legitimacy index will be described in greater detail in Section D of Chapter 4 on methodology.

(B) Qualitative Research

1. Focus Groups: Issues, Problems, and Success

This research has two components: qualitative and quantitative. Whereas the focus group research contains most of the qualitative analysis, there was some qualitative analysis gathered from the surveys as well. One of the qualitative objectives for both the focus group and the surveys was to initially determine the key issues and problems facing watershed groups, as well as to identify areas of success. For the survey, these issues were also tested statistically, but again the goal was the discovery of pertinent issues for future research. In the focus groups, certain topics of interest identified from prior research were presented as topics of discussion by me. This was done in order to facilitate conversation about important issues that were previously identified in the literature as potential problems for watershed collaboration. I had to be very careful, however, not to steer or direct the focus group participants for fear of biasing my results. Therefore, once discussions commenced I tried to stay out of the conversation and allow the focus group participants to freely state their opinions. In a few cases when focus group participants did stray way off topic I would then intervene to bring them back to the general issue at hand. This information was then studied using qualitative analysis which is discussed further in the next two sections. The focus groups were also used to fine tune the survey by adding, subtracting, or editing topics for questions, as well as by changing the actual wording of questions based on the discussions resulting from the focus group meetings. Thus, the quality of
the survey was improved as a result of the focus group sessions. The exact procedures used for
the focus groups will be described in Chapter 4 on methodology.

2. Survey: Issues, Problems, and Success

The survey itself was developed through the use of an initial set of questions which
related to issues I wanted to investigate based on the literature review. These initial questions
were pretested using volunteers from the watershed groups and then revised based on the results
of the pretest. The selected volunteers were usually participants from the focus groups who
answered the survey questions prior to mass distribution to all of the survey respondents. There
was a special section to this survey pre-test that allowed the volunteers to give me feedback on
the various questions they had just answered. I used this feedback, where applicable, to improve
the final survey with changes to the wording of questions, as well as additions or subtraction of
certain questions.

There were three main goals of the survey. The first was to identify legitimacy-related
problems, thus supplementing the qualitative results of the focus groups. The second goal was to
calculate a measure of perceived legitimacy (legitimacy index) based on survey responses to
selected questions. The third goal involved quantitative methods to statistically test hypotheses
regarding the relationship between legitimacy, scale, consensus, diversity and other factors. The
first goal was qualitative and the last two were quantitative.

Specific questions from the survey were used in calculating the legitimacy index which
would serve as a measure of perceived legitimacy. These questions and the exact procedure used
in the calculation of the legitimacy index will be described in greater detail in the methodology
section of the paper. Hypotheses testing were conducted on Likert scores for certain topics
queried in the survey. These Likert score were compared statistically to perceived legitimacy (LI) and other topics in the survey where a relationship was expected based on the literature review. Many questions were not subject to any statistical testing, but received only basic analysis by determining how many people answered a certain way. This information would serve a valuable purpose in targeting specific legitimacy-related areas of concern within the three watersheds, and thus meet one overall goal of the project -- guiding future research on the topic of watershed group legitimacy.

(C) Quantitative Research

1. Surveys and the Calculation of a Legitimacy Index

One of the main purposes of the survey was to get survey responses that could be used in the calculation of a legitimacy index. There were twelve questions on the survey that dealt specifically with the elements of legitimacy described in the literature review section. These questions were all Likert scale questions, and asked respondents to agree or disagree on a 7-point scale. The results of these questions were multiplied by the weight for each legitimacy element. The weight for each legitimacy element was determined by survey responses to questions that asked respondents to weigh the twelve elements. A second weighting system was determined by my own subjective analysis of the literature reviewed with regard to the twelve elements of legitimacy. So, in this paper two types of legitimacy indices were calculated: one using weights determined by the survey respondents and one determined by me and based on my reading of the literature. These are referred to in this paper as survey weights and literature review weights.

The legitimacy index was compiled via a summation procedure whereby the values of the twelve elements were added to get an overall legitimacy index value for each survey respondent.
The exact calculation of these legitimacy indices as well as the 12 legitimacy questions used in the analysis, are described later. These legitimacy index values would then serve as a measure of legitimacy that could be analyzed in conjunction with other data obtained from the survey including: scale, consensus, demographic factors, watershed group, and others.

2. The Effect of Scale, Consensus, and Diversity on Legitimacy

A second major focus of this research is to study the effects of scale or size of the watershed, consensus, and diversity on the legitimacy of watershed groups. Once the legitimacy index was calculated, it could be analyzed statistically with data from other questions on the survey, with particular attention to scale, consensus, and diversity. These three topics have been shown to be major factors in watershed collaboration impacting legitimacy, and are thus a main emphasis of this study. Nonparametric tests, which are described later in more detail, were used for testing of this ordinal (Likert) data and the legitimacy indices.

(D) Summary List of Objectives

- Qualitatively determine Issues, Problems and Successes for the Three Watershed Groups (Focus Groups and Surveys)
- Calculate a Legitimacy Index for Analysis (2 weighting systems)
- Compare the 2 Legitimacy Indices (2 weighting systems)
- Statistically test the relationship between three factors: scale, consensus, and diversity, and perceived legitimacy (legitimacy index)
- Statistically test the relationship between other data gathered in the survey and perceived legitimacy (legitimacy index)
- Draw conclusions about how issues and problems of legitimacy as identified here could threaten or affect present day policies related to voluntary, compliance-based watershed collaborations
- Use any legitimacy issues and problems identified in the research to evaluate the general effectiveness of the collaborative, voluntary approach, and make possible recommendations based on the flaws in this strategy
CHAPTER 4

METHODOLOGY

(A) Selecting the Watersheds

I selected three watersheds in northern Illinois and southern Wisconsin for analysis based on several factors. I wanted watersheds relatively close to my location at the University of Wisconsin-Stevens Point where I was on staff. I also wanted watershed groups that had been in existence for at least 10 years to ensure participants had ample time to be exposed to and learn about the various legitimacy issues I was studying. Two large basins in southern Wisconsin served that purpose well: the Rock River Basin and the Southeast Fox Basin. Both basin groups, the Rock River Basin Coalition and the Southeast Fox River Partnership, have been around over 10 years and represent some of the most successful basin initiatives started by former Wisconsin DNR chief George Meyer in the 1990’s. For this reason its participants and former participants are knowledgeable about legitimacy-related issues in their respective watersheds. Also, many of the people who I contacted off a list provided to me by the basin facilitators were working in small watersheds nested within the larger basin, which allowed me to investigate scale issues.

The third watershed group selected was the Poplar Creek Initiative in northern Illinois and operated on a much smaller scale (44 square miles) than the two larger basins (1000 to 3400 square miles). However, because some of the participants in the Poplar Creek watershed group were also involved in larger umbrella groups like the Chicago Metropolitan Area Planning Commission (CMAP) and the Fox River Ecosystem Partnership (FREP), I was still able to look at scale comparisons in this watershed as well.
The U.S. Geological Survey (USGS) uses Hydrologic Unit Codes (HUC) to categorize different watershed scales. A 6-digit number along with a name identifies the largest 352 river basins in the United States. The next level down from HUC 6 is the HUC 8 watershed, also called cataloguing units, and these are at least 700 square miles in area, with many much larger than that. There are 2,149 cataloguing, or HUC 8 unit watersheds in the United States. These are often referred to as sub-basins and are relatively large, with a fair number of them having some sort of organized watershed management organization in place. They are also sometimes called 4th level watersheds. The HUC 10 level is called the watershed level (or 5th level), and cover an area between 62 and 390 square miles. The next size is the HUC 12 or sub-watershed basin. These drain an area ranging from between 15 and 62 square miles. These are also referred to as the 6th level.

In order to examine the scale issues I mentioned earlier, I had survey respondents who were involved in watersheds at the sub-basin or HUC 8 scale, as well as the watershed level (HUC 10) and the sub-watershed level (HUC 12). Of the three watershed groups targeted for my study, the two largest scale watershed groups, the Rock River Coalition and the SE Fox River Partnership, came from the HUC 8 sub-basin level. The third and smallest of my study watersheds was the Poplar Creek watershed (Poplar Creek Watershed Coalition), which at 44 square miles represents an HUC 12 or sub-watershed scale in the USGS system. I also had other survey respondents from HUC 10 and HUC 12 watersheds nested within the Rock and Southeast Fox Rivers. Many of these respondents would attend meetings for the bigger basins, but actually worked within smaller scale watersheds representing tributaries of the Rock and Southeast Fox Rivers.
When selecting watersheds, I initially wanted to keep some factors the same, such as time of existence, amount of funding, type of watershed management organization, and type of government involvement. This was desired as a means of controlling for some other non-legitimacy variables. However, due to the diversity of watershed organizations in my study areas in Illinois and Wisconsin, I did not think it was realistic to control for all of these variables. I catalogued information related to these variables in an attempt to determine context, and for use in later statistical analysis of factors that can potentially impact legitimacy. These factors have been shown to be key determinants of “successful” watershed planning in previous studies. Length of time has been discovered to be one of these key determinants of “success” (Leach, Pelkey and Sabatier 2002) and all three of my selected watersheds have been operating for ten years or more, which is a long time for the relatively recent phenomena of watershed collaborative groups. Funding has also been identified as a factor affecting watershed planning effectiveness, so I wanted to choose groups that have received some funding from a governmental agency at some time during its existence. All three of my watershed groups have received various forms of governmental funding. I had also wanted to select organizations that have representatives from federal or state agencies, as well as local governmental agencies. All three of my watershed groups have representatives from these three levels of government.

Finally, I wanted to study similar types of watershed organizations. Moore and Koontz (2003) categorized collaborative watershed groups into three distinct types: citizen-based, agency based, and mixed partnerships. Citizen-Based Groups tend to be agenda-driven and usually are anything but inclusive of all stakeholders, so for that reason I initially wanted to avoid those types of groups. However, spokespersons for the River Alliance of Wisconsin have stated that citizen-based groups really dominate watershed planning within the state of Wisconsin,
and it would be impossible for me to exclude these types of groups. Some of the nested scale watersheds within the Rock and SE Fox basins would be categorized as citizen-based by Moore and Koontz (2003). The three main watersheds selected for study, however, are all similar in that they represent hybrid watershed organizations because of their mixture of governmental agencies and citizen-based groups. The Poplar Creek Coalition started out as a citizen-based group, but evolved over time into a hybrid group as it allied with local and state governmental agencies.

(B) Focus Group Methodology

The qualitative analysis part of this dissertation revolved around three focus groups conducted in southern Wisconsin and northern Illinois in 2008. Focus groups were conducted to provide a qualitative component to the research and thus augment the quantitative results derived from the survey, but they were also done in order to make the survey better by identifying important issues not covered in the initial survey. The initial survey questions were the result of a literature review, and survey methodology will be discussed in greater detail in the next section of this paper. Focus group participants were urged to ferret out issues and problems not originally asked by the researcher that may not have been inserted into the initial survey by me. It should be noted that several significant changes to the survey did occur as a result of these focus groups, as focus group volunteers did identify important legitimacy topics not addressed in my original survey. In addition, feedback was received from a set of questionnaire completed by pre-test volunteers, many of whom were also focus group volunteers. This feedback also resulted in some changes to the final survey. So, there were three steps to the development of my final survey: (1) my initial questions based on a literature review, (2) questions added based on
important topics discussed in the focus groups to create an edited survey, and (3) a pre-test of the edited survey which further refined and improved the final survey.

The first focus group was conducted in the Southeast (SE) Fox Watershed in southeastern Wisconsin, where urban and suburban land uses predominate. However, there still exist some significant pockets of agriculture. The Rock River Basin was the location for the second focus group and is located to the west of the Southeast Fox Basin, in south central Wisconsin. This watershed flows through urban areas around Madison, Janesville, and Beloit and is a mixture of rural and urban landscapes, but agricultural land uses make up over 75 percent of the basin. The two Wisconsin watershed groups, the SE Fox River Partnership and the Rock River Coalition, are basin wide organizations (over 1000 square miles drained for SE Fox and over 3800 square miles for the Rock) and are part of a program of large basin partnerships set up by the Wisconsin Department of Natural Resources (DNR) in the late 1990’s. Many of these basins exist in name only today, as much of the effort has not been sustained. The Rock and the SE Fox are notable exceptions, however. They have thrived mostly due to pre-existing institutions, effective leadership, and assistance from the DNR. The third focus group was conducted in the Poplar Creek Watershed in northern Illinois, a much smaller and mostly suburban watershed in the Chicago metropolitan area.

The Poplar Creek Watershed Planning Committee is different from the other two in that it operates at a much smaller watershed scale (roughly 44 square miles), and is nested within the larger Fox River Ecosystem Partnership of northern Illinois. Besides technical and funding assistance from the Fox River Ecosystem Partnership (FREP), this group benefited from the efforts of the Chicago Metropolitan Area Planning Organization (CMAP) which works on water-related issues in the urban-suburban area. Poplar Creek is a different type of partnership in that it
started as a grassroots, citizen-based group that later evolved into a “hybrid” (Moore and Koontz 2003) organization, as local villages and agencies such as FREP and CMAP became more involved with it. The Poplar Creek watershed exists entirely within a metropolitan area, namely the suburbs of Chicago, and its urban nature separates it from the two larger basins in Wisconsin.

In addition to improving the questionnaire used in the final survey, the focus groups were conducted to provide more detailed and rich qualitative information regarding legitimacy issues within watershed collaborations. Qualitative Data Analysis was utilized to study the focus group communications. The two focus groups conducted in Wisconsin were recorded by a professional court reporter. Due to funding constraints, the third focus group in the Poplar Creek watershed of suburban Chicago was tape-recorded and later transcribed by me in my office. Qualitative data analysis was utilized to help organize the data resulting from the three focus groups.

Each of the three focus groups contained 5 or 6 people and lasted from 1 hour and 30 minutes to about 2 hours. Despite lack of experience in this area, I led each focus as best I could and used written materials from experts in the field. As per the advice of such experts, I was careful to steer the discussion into topics of interest while not pushing the participants to answer one way or the other. In addition, I wanted the focus group participants to give me their open ended input, but had to temper that at times by steering the conversation back to the original topics. There were about 6 to 8 topics of discussion that I had determined ahead of time based primarily on previous research. I would bring up these topics in the conversation, ask one or two questions relevant to it, and then stand back and listen to the responses of my focus group volunteers. It was a balancing act at times to keep the participants on the topic without interrupting them or leading them in one direction or another. I tried to avoid meddling or injecting my own opinions into the group discussion unless it helped clarify a question. The
topics discussed in the focus groups will be described in greater detail in a later section on focus group analysis and results.

In his classic book on content analysis, Berelson (1951) refers to the actual content of communication as “indicators.” These indicators relate to the larger, overriding themes or “categories” as Berelson calls them. Within my focus groups, then, transcribed wording of the participants represents the indicators, and these indicators can in turn be linked to various categories or themes. These linkages are investigated in order to establish some working hypothesis regarding the focus group results. Berelson cautions that the researcher cannot simply list quotations and call it a day. In conjunction with the scientific method, problems and hypotheses must be stated and tested, just as in any research project.

However, my research is exploratory and therefore the indicators were used to develop the hypotheses, but not test them. The indicators from the focus groups were used to identify important issues and problems, which were then carefully worded into several hypotheses. These hypotheses that were formulated from the indicators could then be tested by later research. In the meantime, the formulation of hypotheses that illuminate key issues in watershed organizations was the main goal.

Besides the indicators from the content of communication from the focus groups, hypotheses were also developed from prior literature research, as well as from my own analysis of focus group communication. In addition to providing topics of future research, these hypotheses help to provide background and context to the survey results. Hypotheses developed here could thus provide insight into what could occur in watershed groups similar to the ones of this study.
For each of the three focus groups, I analyzed the content to see what themes were continually referred to by the participants (various indicators) within the communication as transcribed by myself or the professional court reporter. Within the focus group results described below, these themes and their supporting indicators are laid out and related to the hypotheses they helped develop.

(C) Survey Methodology

The quantitative part of this research paper will be based on a questionnaire administered to various watershed group participants and knowledgeable non-participants. The questions will be used to collect information related to two of the research goals. One purpose of this research is to determine how scale, consensus, and diversity affect the legitimacy of watershed planning organizations. The concept of scale is one that appears to require more research due to the multitude of geographical scales that watershed groups operate within. The issues of scale, consensus, and diversity are the main independent variables that will be tested to determine their impact on perceived legitimacy (as measured by a legitimacy index).

Before any analysis can take place, however, it becomes necessary to develop a method to measure the concept of legitimacy. Such a legitimacy index can not only be used to determine how scale, consensus, and diversity affect the elusive concept of legitimacy, but it can be utilized to understand differences in legitimacy based on other factors within the watershed. In addition, it is hoped that a legitimacy index can help future researchers measure this relatively abstract concept as it relates to watershed planning and watershed group activities. One main goal of this study, then, is to calculate a workable legitimacy index that hopefully can have applications in
other watershed studies. It is important to note, however, that this legitimacy index is a measure of perceived legitimacy because it is based on perceptions of the survey participants.

1. **Survey Questions and the Legitimacy Index**

How is the legitimacy index determined? Legitimacy here is based on the perceptions of stakeholder participants and knowledgeable non-participants regarding various elements of legitimacy, as derived from a survey questionnaire. As described in the literature review, determining what constitutes a legitimate plan and process can be problematic, but there are certain elements that most authors seem to agree are good indicators of legitimacy. These major elements of legitimacy as derived from the literature search can be seen in Table 4.1 below.

**Table 4.1 – Major Elements of Legitimacy**

1. Inclusive Participation  
2. Proper Representation  
3. Transparency  
4. Fairness  
5. Trust  
6. Accountability  
7. Consensus  
8. Public Participation  
9. Justice (Outcome)  
10. Information Exchange  
11. Use of Local Knowledge  
12. Use of Scientific Knowledge

There are 12 questions in the survey that ask respondents their opinion on how well these 12 elements of legitimacy are incorporated into their watershed group. These responses will be multiplied by a weight for each element and added to get an overall legitimacy index. A more
detailed description of the legitimacy index, along with the weighting systems used in the
calculation of this index, can be found in section D (“Developing a Legitimacy Index”) of this
chapter. The 12 questions used to determine the legitimacy index can be seen in Appendix A.
All questions in the survey are listed in Appendix B.

In addition, individual questions can be analyzed separately to determine which elements
of legitimacy within the watersheds studied are served best and which may be lacking. Because
my survey design identifies people according to different demographic groups, legitimacy
problems may be compared across these different groups. Sabatier et al (2005) were clear in
their desire to see future watershed studies placed into a contextual framework, and this research
strives to follow their advice at least with regards to the general types of watersheds studied. In
addition to the main factors of scale, consensus and diversity -- other factors such as income,
participant status, stakeholder group, education, and residence type were tested statistically to
determine their relationship to perceived legitimacy as measured by the legitimacy index.

I relied on knowledgeable experts to help me refine all the questions so as to better elicit
from the respondents the legitimacy information I was trying to obtain. Several personal
meetings with facilitators, coordinators, and other key stakeholders were useful for this purpose.
In addition, a pilot survey or pre-test was given to selected stakeholder volunteers in order to
further improve the questions and head-off any potential problems in question design and avoid
gaps in knowledge.
2. **Selecting the Respondents**

This research paper was based on a survey of participants in a number of watershed planning collaborations in the states of Wisconsin and Illinois. In addition to planning participants, non-participants who are knowledgeable about these planning activities were also included. In an article about surveying diverse stakeholder groups, Leach (2002) concluded that using surveying shortcuts when evaluating watershed organizations is not a good idea. He looked at survey methods that either used only one stakeholder group, only the coordinator, or only participants of the watershed planning process. None of these shortcuts were found to be an acceptable sampling method given the diversity of watershed planning groups. For that reason, Leach argues that all stakeholders in the watershed who are knowledgeable about its planning activities should be surveyed, including non-participants. This is why I have tried to include as many of the stakeholders in the watershed in my sampling design as possible, participants or non-participants, as long as they are knowledgeable about the organization and the salient issues in the watershed. However, I was dependent upon a list of participants as provided by facilitators of the three watershed groups, and my lists may have been lacking a few of these stakeholder groups.

Potential stakeholder groups for the survey included federal, state and local governmental officials participating in or knowledgeable about the watershed planning group. Others stakeholders included developers, traditional and conservation farmers (farm owners and renters), local industry representatives, environmental groups, and interested citizens. However, as is described later in the results section of this paper, some stakeholder groups were strongly represented while others were sparse or absent. I did not use a stratified random sampling
methodology so I was unable to acquire a set number of stakeholder types from my list. This limited my ability to make generalizations, but again, this research is exploratory in nature. The exact types of stakeholder groups surveyed can be seen in my survey results later, but for now it is important to stress that I did not have a random, truly representative sample. For this reason, this research functions only as a pilot study.

Once the initial questions were developed (changed and refined later after input from participants as described above), I set up a design using the web-based survey tool “Survey Monkey.” This was done to facilitate ease of response and to reduce costs. In addition to convenience and low costs, internet-based questions avoid some of the bias or prompting that may be done intentionally or unintentionally by surveyors when conducting face-to-face interviews or by phone (Dillman 2000). Due to a strict non-spam policy by Survey Monkey, I first needed to contact each and every potential respondent by email to see if they would agree to do my survey online. If they did agree, I would then send them a link to the Survey Monkey site, where they could take my 61 question survey online.

3. Investigating Scale, Consensus, and Diversity

Besides scale which was described above, other themes investigated were consensus and diversity. Consensus-based watershed collaborations are the norm, so I relied on respondents to tell me if their watershed group (remember, some people in the Rock and SE Fox are in smaller-scale nested groups) is consensus-based or non-consensus based. The question for this task was worded as follows: “Choose the statement below that best describes your watershed group?” There were three choices: (1) a democratically-driven group run via a participatory voting
process, (2) an organized hierarchy with a strong leader and clear direction, (3) a consensus-based group whereby agreement is required by all participants. Because there are varying levels of agreement (total unanimity versus a plan all can “live with”) I also asked the respondents who chose consensus above to rate their group’s need for consensus. The question was directed only to those who chose #3 above, and was worded as follows: “Rate the degree to which your group relies on consensus for decision-making in your watershed.” There were 4 options for this question: (1) Very Strong Need for Consensus, (2) Strong Need for Consensus, (3) Moderate Need for Consensus, and (4) Slight Preference for Consensus. I could thus compare levels of consensus for the watersheds represented in my study to other elements of legitimacy, as well as to overall legitimacy as measured by the legitimacy index. I could also compare watersheds that use a consensus-model of decision-making versus those that use some other model (consensus versus non-consensus).

Another context-related focus of my study is diversity. How does diversity of watershed planning relate to legitimacy? I was able to investigate the issue of demographic diversity because I had one section of questions in the survey that dealt with income, gender, race, education level, and residence type (rural, town, urban). For these questions the respondents would be asked to select one of several categories for these demographic variables. Demographic factors could then be compared to perceived legitimacy as determined via the legitimacy index. The demographic diversity of the survey participants, many of whom are present or former watershed group members, could also be compared to the overall demographic diversity of the citizenry of the watershed. This was because I did an overlay of all three watersheds using Census data. The census data were “clipped” (using GIS or extracted manually
from files) so I had the demographic make-up of the citizens in the watersheds. A description of this process will be discussed in more detail in a latter section.

4. **Sampling Frame, Bias, and Response Rates**

Salant and Dillman (1994) refer to a list of potential samples as a sampling frame. A good sampling frame is one that avoids duplicates, but also is inclusive of the entire population desired to be surveyed. The sampling frame used in this research consisted of three lists of participants and former participants in watershed organizations, received from the facilitators of the three watershed organizations: Rock River, SE Fox, and Poplar Creek. I then contacted the individuals on these lists via email and asked them if they would participate in my survey. If they agreed, I sent them a link to the Survey Monkey survey. A lack of resources prevents me from surveying average citizens, but some of the questions dealt with issues of public involvement, transparency, accountability and access to information.

There are several problems associated with my sampling frame that lead to potential bias. First, the lists consisted mostly of present-day group participants with only a few former members listed. For this reason it fails the inclusive test of Salant and Dillman (1994), and with a few exceptions leaves out many of the people I wanted to survey, namely knowledgeable non-participants. Second, I was dependent on the knowledge and competence of the three facilitators to provide me with accurate, timely, and inclusive lists. This is less of a problem than the first one, because after much contact with them I learned to have a high level of confidence in the leadership of my three watershed groups. Nevertheless, the potential for error and bias from a few select sources of information remains, and needs to be mentioned here. Third, my survey
suffers from the voluntary effect because I had data only from those people who agreed to participate. Fourth, because my survey was done online via Survey Monkey, it was limited to those people who had computers and had timely and accessible email addresses. For these reasons, this survey of watershed group participants and knowledgeable non-participants is not a random sample. Thus, there is an obvious bias leading to a non-representative sample.

However, as mentioned earlier, this research is exploratory and is not attempting to make definitive conclusions, but is rather seeking to ferret out issues and problems amenable for future research.

I had initially targeted a large number of respondents (200 to 300) but literature on web-based surveys indicates that my focus should be based on the response rate, rather than the total number of respondents. The response rate is the number of respondents divided by the number of emails sent out. The smaller the response rate, the more likely the survey will suffer from severe non-response bias which threatens its representativeness (Malaney 2002).

Although Dillman (2000) encourages researchers to shoot for a survey response rate of 80 percent, he does state the difficulty in attaining this goal. Other literature cites an email response rate of 40 percent as average, 50 percent as good, and 60 percent as very good (University of Texas 2007). I sent out a total of 115 emails soliciting help with my survey research. Of the 115 who received the initial email messages, 82 people responded and agreed to do the study. Of the 82 agreeing to do the survey, 58 started the survey for a response rate of 70.73 percent. If I count the first email as contact however, the response rate drops to 58 responses against 115 email contacts, for a response rate of 50.43 percent. Still, this is considered a good rate of response as indicated above. Only 49 out of the 58 who did the survey completed all the questions (not counting the income inquiry), however, so the response rate
drops to 49 out of 115, or 43 percent. This is still considered an average response rate (University of Texas 2007). But again, it must be pointed out that my research is exploratory and so representativeness is not entirely required here. I am not seeking to make generalizations in the way many survey researchers do.

5. Questions to Ask

The questions in my survey can be divided into 4 major groups. The first group involves questions specifically regarding the elements of legitimacy discussed in the literature review. The second group deals with questions regarding scale, consensus, and diversity, about which I have formulated some hypotheses regarding their relationship to legitimacy in watershed collaborations. Among this second group are questions that attempt to get demographic information from the respondents. The third group addresses the role of government in watershed collaborations. The fourth group deals with goals, projects and other factors that determine the long-term survivability of the watershed groups.

My final survey was lengthy at 61 questions and I was worried this would hurt my response rate, but studies on the effect of survey length have yielded mixed and inconclusive results (Porter 2004). There were 58 people who did some part of the survey, but only 49 completed the entire survey. Even a few of these skipped one or two questions such as income level, but I had at least 49 responses for calculating the legitimacy index. Many of the questions used a 7 point Likert scale, as was used by Leach in his survey of stakeholder groups (2002) and by Wieble, Sabatier, and Lubell (2004) in their study of stakeholder beliefs in Marine Protected Areas in California. The Likert scale is less laborious than other surveying methodologies and is
therefore a good choice considering my limited resources (Seale 2004). In addition, Dillman (2000) states that questions such as those used in the Likert method, which he generally refers to as “closed ended questions with ordered response categories,” are very appropriate in situations when “one has a well-defined concept for which an evaluative response is wanted, unencumbered by thoughts of alternative or competing ideas.” I believe my questions fit into this latter category very well. For these reasons I have chosen the Likert procedure to uncover respondent attitudes regarding the legitimacy of collaborative efforts within their respective watersheds (Seale 2004). The Likert response choices can be seen in Table 4.2 below.

### Table 4.2 – Possible Likert Choices for Survey Respondents

1 = Strongly Agree  
2 = Mostly Agree  
3 = Slightly Agree  
4 = Neither Agree nor Disagree  
5 = Slightly Disagree  
6 = Mostly Disagree  
7 = Strongly Disagree

Twelve questions in the survey dealt with the twelve elements of legitimacy as determined by the literature review, and will be used in the calculation of the legitimacy index. Questions that dealt with the elements of legitimacy and used in the calculation of the legitimacy index are shown in Appendix A. A total list of all questions in the survey can be seen in Appendix B.
(D) Developing a Legitimacy Index

A legitimacy index was derived from survey participant responses to questions dealing with commonly accepted components of legitimacy. In order to develop a measure of the legitimacy of watershed planning organizations, survey respondents were asked questions about these twelve elements of legitimacy. Due to the debate about the role of consensus as mentioned in the literature review, however, consensus was not used in determining the legitimacy index. In addition, more than half (29 of 51) of the survey respondents indicated that their watershed group relies on a different decision-making model (democratic or hierarchical) other than consensus, so those respondents skipped the questions about the degree of consensus used in their watershed. For consistency sake, therefore, consensus was taken out of the equation for determining the legitimacy index. The eleven remaining elements of legitimacy were used as the basis for this metric.

The Likert question asking respondents about the legitimacy element of outcome, serves as an example. The respondents were asked to rate the degree to which they agree with the following statement, "The outcomes in my watershed are just and equitable for all interests in my watershed." The survey respondents rated the degree of justice and equity in their watershed by selecting their level of agreement, 1 through 7. The greater amount of agreement with the statement indicated greater legitimacy. For most Likert scale questions, number 1 represented the highest level of legitimacy because it represents the highest level of agreement with a positive statement. The same is true with all eleven questions with the exception of question four in Appendix A, which is a negative indicator because it is actually asking about unfairness, and thus represents the opposite of legitimacy. So, except for this question on fairness
(unfairness), the coding was reversed with 1 becoming a 7 (highest level of legitimacy) and 7 becoming a 1. I did this because for my LI calculation I wanted the highest value to represent the highest degree of legitimacy. That is why Likert values of 1 were turned into values of 7. Thus, when the reversed-Likert score for that element was multiplied times the weight for that element, a higher value would result for more legitimacy, and a lower value would represent less perceived legitimacy.

1. Weighting Legitimacy Elements Based on the Literature Review

A legitimacy index was calculated for each survey respondent based on their Likert ratings for each of the 11 legitimacy element questions. Should the eleven elements of legitimacy receive the same weight for calculating the legitimacy index, or are some elements more important than others? During the literature review I found that certain elements of legitimacy were stressed over others, and therefore decided that not all 11 elements should be weighted the same. Therefore, based on my subjective analysis of this literature review, I weighted the elements with a 1.5, 1.0, 0.75, or 0.5 depending on their importance. I wanted the range of weights to be similar to the weights as determined by the respondents so they could be compared more easily (discussed later). The literature review places the greatest focus on four elements as major requirements for legitimacy: inclusiveness, a fair process, just outcomes, and trust. These four elements received the highest weighting of 1.5. Four other elements seemed to fit into a second tier of importance based on the same literature review: representation quality (Do watershed group participants represent their constituent stakeholders?), public participation, consensus, and transparency. These three elements received a weight of 1.0. Two elements
were placed into the next tier of legitimacy, and included accountability and information exchange, which were given a weight of 0.75. The final two elements, local knowledge and scientific expertise, were given a weight of 0.5 and represented the last tier of legitimacy elements.

Consensus was given a weight of 1.0 as described above, as determined from my analysis of the literature review, but I decided to delete consensus from the calculation of the legitimacy index. I did this because a large percentage of respondents were from groups that did not use consensus (based on survey responses). So, for both types of legitimacy indices, there were only eleven elements of legitimacy used in the calculation. I still used the consensus data, however, to test the influence of this element on overall legitimacy. Below is a list of the legitimacy elements and their weights based on the literature review (Table 4.3).

Table 4.3 - Weights Based on Literature Review (Author’s Analysis)

<table>
<thead>
<tr>
<th>Legitimacy Element</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusiveness</td>
<td>1.5</td>
</tr>
<tr>
<td>Just Outcomes</td>
<td>1.5</td>
</tr>
<tr>
<td>Fairness (Process)</td>
<td>1.5</td>
</tr>
<tr>
<td>Trust</td>
<td>1.5</td>
</tr>
<tr>
<td>Representation (Quality)</td>
<td>1.0</td>
</tr>
<tr>
<td>Transparency</td>
<td>1.0</td>
</tr>
<tr>
<td>Consensus</td>
<td>1.0 (deleted from calculation)</td>
</tr>
<tr>
<td>Public Participation</td>
<td>1.0</td>
</tr>
<tr>
<td>Accountability</td>
<td>0.75</td>
</tr>
<tr>
<td>Information Exchange</td>
<td>0.75</td>
</tr>
<tr>
<td>Use of Local Knowledge</td>
<td>0.5</td>
</tr>
<tr>
<td>Scientific Expertise</td>
<td>0.5</td>
</tr>
</tbody>
</table>
2. Weighting Legitimacy Elements Based on Survey Respondents

The second weighting system relies on the opinions of the survey participants who were asked to rate the eleven elements of legitimacy. The respondents rated the elements using a two-step process involving two separate questions on the survey. The two weights from these two questions were added together to comprise the final weight based on survey respondents. The first question asked respondents to choose their six most important legitimacy elements from a list of twelve (consensus was still an option at this point, but I had to remove it in the final calculations for reasons described earlier). For the second question, respondents were then asked to rate the top three most critical elements from the same list of twelve. The first weight was based on the percentage of respondents who chose that particular element as one of their top six most important legitimacy elements. The second weight was based on the percentage that chose that element as one of their top three. The two weights were added together and then divided by two to get one final weight for that element. In determining a legitimacy index value for each respondent, the final weight for each element was multiplied by the respondent’s Likert score for the survey question on that element of legitimacy, and then the eleven values for all eleven elements were added to get the overall legitimacy index value (LI). Remember, consensus was left out of the calculation because it was not applicable for many respondents, even though it was available for selection in these questions. The total weight for a given element of legitimacy was thus based on the percentage of respondents who chose the element in their top six, added to the percentage of people who chose that same element in their top three, and then divided by two.
How were the weights determined exactly? It is based on the expected percentages for both questions 1 and 2, since both are used in calculating the final weight for each element. It is best to look at Table 4.4 to understand how the weightings were calculated. Look at the standard weight of 1.0 in Table 4.4. The standard is 1.0 and that is the weight applied to an element when 50% of the respondents pick it as one of their top six most important. Because there were twelve possible elements to choose from, and the respondents select the top six out of twelve, the chance that any given element is chosen in the top six is 50% (6/12). In other words, if all elements were indeed equal, each element would be picked by 50% of the respondents. That is why an element gets a standard weight of 1.0 if it is selected by 50% of all respondents. Let’s assume a certain element is so important that it is selected by ALL of the respondents as one of their top six most important elements. If that did happen, then that element would get a weight of 2.0 as seen in Table 4.4. 2.0 is twice as big as 1.0, which makes sense, because having ALL respondents choosing a certain weight is twice what would be expected. On the other end of the spectrum, if an element were deemed less important than other elements, it would be selected by fewer respondents. So, if only 25% of the people selected it (remember, based on twelve choices, it has a 50% chance of being selected in a person’s top six) then it is getting only half the number of selections as expected from chance. Therefore, this element should only get half the weight. Looking at Table 4.4, you can see that this element (one getting 25% of the vote) gets a weight of 0.5, or half of the standard of 1.0.

The second weight for a particular legitimacy index will be based on the percentage of people who pick that element in their top three. Now, we need to look at Table 4.5 for this second weighting. Notice the standard weight is 0.25, instead of 0.50. Why? This is because the respondents are only choosing their top three most important elements for this second weighting.
If all elements were equally important in the eyes of the respondents, then 25% would choose any given element as their top three. That is because three represents 25% of 12. So, for the 2nd weight, 25% is the expected standard rather than 50 percent as was the case with the first weighting.

What if an element got more than the “expected” 25% of respondent votes for this second weighting? Let us say an element got twice as many “votes” as expected, or 50% of all respondents. That is twice the expected standard, and weight assigned to that element would be 2.0. Look at Table 5 and you can see that for elements receiving 50% of the votes, the weight assigned is 2.0. What about an element that was seen as so important that ALL of the respondents chose it in their list of top three? Looking at Table 4.5 we see that the 2nd weight for an element receiving 100% of the votes would be 4.0. Again, it makes sense because 4.0 is indeed four times the value of 1.0 (standard weight), just as 100% is four times as big as 25% (expected percentage).

On the other end of the spectrum, let’s say an element was deemed less important and only 5% of the respondents chose it as one of their top three most important legitimacy elements? Its 2nd weight should only be 1/5th as large as the standard of 25%. Looking at Table 4.5 we see that this is indeed the case. Elements receiving a vote from 5% of the respondents get assigned a 2nd weight value of 0.2, which is 1/5 of the standard percentage for the second weighting (25%).

So, let’s review the steps for assigning a weight (based on survey respondents) to a legitimacy element.

1. Determine the percentage of respondents who chose that element in their top six most important elements.
2. Use Table 4.4 to assign a first weighting to that element.

3. Determine the percentage of respondents who chose that element in their top three most important elements.

4. Use Table 4.5 to assign a second weighting to that element.

5. Add the first and second weightings together, and divide by two.

Following these steps, we see that any element that gets 50% of the vote for top six (expected), and 25% of the vote for top three (expected), would get a first weighting of 1.0 and a second weighting of 1.0. Adding these together and dividing by two gives us a weight of 1.0 for that element. The two weightings together give a better measure of the perceived importance of an element, than just one.

As an example, two elements could both be picked by 75% of all respondents for their top six and both would get a first weight of 1.5 (Table 4.4). The first element may get 50% of the vote for top three and get a 2nd weight of 2.0 (Table 4.5), whereas the 2nd element may only get 25% of the vote for top three and get a 2nd weighting of only 1.0 (Table 4.5). The first element would get a final weight of 1.5 plus 2.0 divided by 2, or 3.5/2, which equals 1.75. The second element would get the same first weight of 1.5, but its 2nd weight is only 1.0. Its two weights added together (1.5 and 1.0), and this divided by two would be 2.5 divided 2.0, or 1.25. The first element got the higher overall weighting based on its higher percentage of voters for top three, even though both got the same percentage for top six. Thus, the second weighting fine tunes the perceived importance of the elements. That is the usefulness of asking the respondents to choose their top six, and then their top three, most important elements.
To better understand the weighting system, study the table listed below. Remember, the first weight and the second weight are added together, divided by two, and then multiplied by the opposite Likert value (7 = 1, 6 = 2, etc.) chosen for that element for that particular respondent. All respondents in the survey who answered the questions for the eleven elements of legitimacy had a legitimacy index calculated for them. This turned out to be 49 of the 61 people who started the survey.

It should be noted, again, that because 1 is the highest legitimacy value for most questions (except for the one dealing with fairness), I reversed the Likert scores for calculation purposes. A 1 becomes a 7 (highest legitimacy), a 2 becomes a 6, 3 becomes 5, 4 stays a 4 (neither agree nor disagree), 5 becomes a 3, 6 becomes 2, and 7 becomes a 1 (lowest score). This holds true for all eleven questions except for fairness, which asks the respondents if they believe their watershed is unfair (rather than fair), and thus a high level of agreement (1 on the Likert scale) indicates a low level of legitimacy. Thus, for fairness the low value of 1 is retained.

This index of legitimacy should serve as a useful methodological tool for future study of legitimacy in different watersheds. In this study the legitimacy index, along with individual responses to questions on specific elements of legitimacy, were compared to contextual factors such as watershed scale, decision-process type (consensus or other), and demographic diversity factors to determine how these variables related to the legitimacy of watershed groups. In addition, the two different methods of weighting the elements (respondent versus literature review) were studied to see how they affect the legitimacy index, and that will be discussed throughout the results section of the paper.
SURVEY-DETERMINED WEIGHT CALCULATION WEIGHT 1 VALUES – 1st Part of Weighting Based on Surveys, (Based on the percentage of people who choose a given element in their TOP SIX most important elements from a total of twelve. All percentage points are rounded to the nearest five percent)

Table 4.4 – Weighting System 1

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Weight Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.0</td>
</tr>
<tr>
<td>5%</td>
<td>0.1</td>
</tr>
<tr>
<td>10%</td>
<td>0.2</td>
</tr>
<tr>
<td>15%</td>
<td>0.3</td>
</tr>
<tr>
<td>20%</td>
<td>0.4</td>
</tr>
<tr>
<td>25%</td>
<td>0.5</td>
</tr>
<tr>
<td>30%</td>
<td>0.6</td>
</tr>
<tr>
<td>35%</td>
<td>0.7</td>
</tr>
<tr>
<td>40%</td>
<td>0.8</td>
</tr>
<tr>
<td>45%</td>
<td>0.9</td>
</tr>
<tr>
<td>50%</td>
<td>1.0 – STANDARD WEIGHT</td>
</tr>
<tr>
<td>55%</td>
<td>1.1</td>
</tr>
<tr>
<td>60%</td>
<td>1.2</td>
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<tr>
<td>65%</td>
<td>1.3</td>
</tr>
<tr>
<td>70%</td>
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<td>75%</td>
<td>1.5</td>
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<tr>
<td>80%</td>
<td>1.6</td>
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<tr>
<td>85%</td>
<td>1.7</td>
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<td>90%</td>
<td>1.8</td>
</tr>
<tr>
<td>95%</td>
<td>1.9</td>
</tr>
<tr>
<td>100%</td>
<td>2.0</td>
</tr>
</tbody>
</table>
**WEIGHT 2 VALUES – 2nd Part of Weighting Based on Surveys**, (Based on the percentage of people who choose a given element in their TOP THREE most important elements from a total of twelve. All percentage points are rounded to the nearest 5%)

---

**Table 4.5 – Weighting System 2**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Weight Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.0</td>
</tr>
<tr>
<td>5%</td>
<td>0.2</td>
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<tr>
<td>10%</td>
<td>0.4</td>
</tr>
<tr>
<td>15%</td>
<td>0.6</td>
</tr>
<tr>
<td>20%</td>
<td>0.8</td>
</tr>
<tr>
<td>25%</td>
<td>1.0 – STANDARD WEIGHT</td>
</tr>
<tr>
<td>30%</td>
<td>1.2</td>
</tr>
<tr>
<td>35%</td>
<td>1.4</td>
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<tr>
<td>40%</td>
<td>1.6</td>
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<td>45%</td>
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<td>50%</td>
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<td>60%</td>
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<td>3.2</td>
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<td>95%</td>
<td>3.8</td>
</tr>
<tr>
<td>100%</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Based on the formula shown below, each element was given a weight by each survey respondent. All 49 respondents’ final weights were then added together and divided by 49 to get an average weight for each element. This average weight was the value used for weighing each element when calculating the legitimacy index (LI – survey weights). These final weights are shown below in Table 4.6, ranked according to which elements received the highest weighting-values.
FINAL SURVEY BASED WEIGHT CALCULATION – WEIGHTS 1 AND 2

Weights Based on Survey Respondents’ Rankings of Legitimacy Elements

Final Weight for Each Element = Weight for Question1 + Weight for Question 2

Table 4.6 - Weights Based on Survey Respondents Rankings – Average for 49 Respondents

<table>
<thead>
<tr>
<th>Legitimacy Element</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Participation</td>
<td>1.75</td>
</tr>
<tr>
<td>Scientific Expertise</td>
<td>1.35</td>
</tr>
<tr>
<td>Information Exchange</td>
<td>1.25</td>
</tr>
<tr>
<td>Accountability</td>
<td>1.15</td>
</tr>
<tr>
<td>Fairness</td>
<td>1.1</td>
</tr>
<tr>
<td>Trust</td>
<td>0.95</td>
</tr>
<tr>
<td>Use of Local Knowledge</td>
<td>0.95</td>
</tr>
<tr>
<td>Inclusiveness</td>
<td>0.95</td>
</tr>
<tr>
<td>Transparency</td>
<td>0.75</td>
</tr>
<tr>
<td>Consensus</td>
<td>0.70 (deleted from calculation)</td>
</tr>
<tr>
<td>Just Outcomes</td>
<td>0.65</td>
</tr>
<tr>
<td>Representation</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Table 4.7 – Final Weights Comparison – Survey Weights vs. Literature Review Weights

<table>
<thead>
<tr>
<th>Legitimacy Element</th>
<th>Survey Respondent Weight</th>
<th>Literature Review Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusiveness</td>
<td>0.95</td>
<td>1.5</td>
</tr>
<tr>
<td>Representation</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Transparency</td>
<td>.75</td>
<td>1.0</td>
</tr>
<tr>
<td>Fairness (Process)</td>
<td>1.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Trust</td>
<td>.95</td>
<td>1.5</td>
</tr>
<tr>
<td>Accountability</td>
<td>1.15</td>
<td>.75</td>
</tr>
<tr>
<td>Consensus</td>
<td>.7 (deleted from calculation)</td>
<td>1.0</td>
</tr>
<tr>
<td>Public Participation</td>
<td>1.75</td>
<td>1.0</td>
</tr>
<tr>
<td>Just Outcomes</td>
<td>.65</td>
<td>1.5</td>
</tr>
<tr>
<td>Information Exchange</td>
<td>1.25</td>
<td>.75</td>
</tr>
<tr>
<td>Use of Local Knowledge</td>
<td>.95</td>
<td>.5</td>
</tr>
<tr>
<td>Scientific Expertise</td>
<td>1.35</td>
<td>.5</td>
</tr>
</tbody>
</table>
How do the survey-based weights compare with my literature review weights? The final weights using both methods are shown in Table 4.7 above. The weights for each element are different according to the weightings system: survey or literature review. The weighting values seen above in Table 4.7 were rank ordered and a Mann-Whitney U test was run to see if there was a difference between the two weighting systems. The ranking information for this test is shown in Table 4.8 below. Based on a significance value of 0.671 for a two-tailed test (neither systems was expected to be better than the other), there was no significant difference detected between these two sets of weighting systems. The test would have also been insignificant at a 1-tailed test anyway, with a significance value of 0.642.

<table>
<thead>
<tr>
<th>Weighting System</th>
<th>N Size</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey-Based</td>
<td>24</td>
<td>11.83</td>
<td>142.00</td>
</tr>
<tr>
<td>Literature-Based</td>
<td>24</td>
<td>13.17</td>
<td>158.00</td>
</tr>
</tbody>
</table>

Table 4.8 – Mann Whitney U Test of Survey Weights vs. Literature Review Weights

(E) Testing the Effects of Scale, Consensus, and Diversity (Demographics)

1. Ordinal Data

Another major focus of this research was to determine what effects, if any, scale, consensus and diversity have on the perceived legitimacy of watershed collaborations. The dependent variable for many of the statistical tests was the legitimacy index (LI) calculated using the procedures described above. Because the legitimacy value was calculated from Likert data, I decided to use non-parametric statistical testing. Likert data are ordinal data because while it is
easy to assume some order or ranking, the interval between each Likert selection cannot be assumed to be equal. For this reason, parametric tests are not allowed. Even if the calculated LI values appear to be numerical, they must be treated as ordinal data if they are derived from data that are in an ordinal form initially (Siegal 1956). Thus, the resulting calculated values must be treated as non-parametric data.

Some of the statistical tests conducted in this paper compared categorical data versus ranked data (Mann-Whitney U or Kruskal-Wallis), some compared ranked versus ranked data (Spearman Rank), and some compared categorical versus categorical data (Chi-Square). In all cases these were non-parametric tests that were applicable for either ranked (ordinal) or categorical data. The exact tests used and their application are described in more detail below. For privacy purposes, the names, occupations, education, and income levels of my survey respondents are not reported. However, I did compile the demographic data from these respondents and used it for comparison purposes.

2. Nonparametric Testing

There were four major nonparametric tests used to test variables related to scale, consensus, and diversity. As mentioned above, these four nonparametric tests were Mann-Whitney U, Kruskal-Wallis, Spearman Rank, and Chi-Square. Mann-Whitney U was used when I tested the effect of a categorical variable on a set of ranked data when the categorical variable contained only two different categories. The test for the impact of two levels of scale on perceived legitimacy (ranked LI values) is an example of where I used Mann-Whitney U. This was true for tests of LI based using both weighting systems: literature review and survey-based.
When testing the relationship between three or more categories and ranked data, I switched to a Kruskal-Wallis test because it allows more than two categories, unlike Mann-Whitney U which does not. An example of this was my test for three levels of scale: small, medium, and large and their effect on legitimacy index values (LI). Another example of Kruskal-Wallis was the test of five levels of consensus on perceived legitimacy (LI values). In this case, the five levels of consensus represented the categorical, independent variable and the LI values represented the ordinal (ranked), dependent variable.

Because Spearman Rank is a correlation that can be used on rank data, I theoretically could have used it for any of my Likert question results. However, because there were only 7 possible Likert responses presented to participants, most of these tests would have involved ranked data with a very large number of ties. For this reason, I limited my use of Spearman Rank to only a few instances, such as scale (three levels – small, medium or large) and its relationship to issues outside of the watershed (7 possible Likert values). Even in this case, however, there were still a large number of ties.

Finally, in situations involving a test of categorical variables, I relied on Chi-Square. Much of the Likert data collected via the survey was reduced to categories for ease of testing and to avoid the multiple ties problem mentioned above. One example of a Chi-Square test involved three levels of scale (small, medium or large) versus three levels of concern for local knowledge. Another example was a comparison of two levels of consensus (yes or no) and concern for protection of local environmental interests. The results section will describe this statistical testing in more detail.
CHAPTER 5
FOCUS GROUPS: ANALYSIS AND RESULTS

(A) Rock River Watershed

1. Background to the Basin

The Rock River Basin drains over 3,800 square miles in south central Wisconsin and is made up of over 3,900 river miles. Although this watershed flows through urban areas around Madison, Janesville, and Beloit and is host to a population of about 760,000, agriculture is still the primary land use for roughly 75 percent of its 2.4 million acres (Rock River Coalition website 2008). The headwaters of the Rock start northwest of the city of Waupun and the main trunk flows south through Watertown, Jefferson, and Fort Atkinson. The Rock River continues into Illinois near Beloit, Wisconsin and eventually empties into the Mississippi River at Rock Island, Illinois. The flow regime of the Rock River is considered to be smooth, and for the most part is absent fast-running water (Wisconsin DNR 2002a). A map of the Rock River Basin, along with its relative location within the state of Wisconsin, is shown below in Figure 5.1.

The Rock River is divided into 28 watersheds ranging in size from about 30 to 290 square miles. A few cold water trout-laden streams exist; but most watersheds are drained by slower moving, warm-water streams. Like many watersheds in the agricultural Midwest, the Rock River Basin contains a large number of diversions and impoundments. The Rock River contains 443 impoundments and lakes according to the Wisconsin Department of Natural Resources.
(Wisconsin DNR 2002a). These lakes are heavily used recreationally by nearby urban residents for such things as boating, fishing and swimming.

Figure 5.1 – Map of the Rock River Basin (Source: Wisconsin DNR)
Figure 5.2 – Land Use in the Rock River Basin (Source: Wisconsin DNR)
2. Physical Geography and Cultural History

Geologically, glacial deposits and landforms from the Wisconsin glaciation that peaked about 20,000 years ago are the most dominant features. The rolling landscape that we see in southern Wisconsin today is largely a result of this glacial period, and associated landforms are drumlins, kettles, kames, marshes, and moraines. An area of unusual kettle and kame topography is located in the southeastern part of the basin in an area where two glacial lobes met, and where the northern and southern units of Kettle Moraine State Forest now exist. Underlying these glacial features are rock formations that originated from ancient ocean deposits, and these make up the bedrock foundation of the Rock River Basin. One prominent bedrock outcropping is the Niagara Escarpment, which consists of resistant limestone that is visible in the northeastern part of the basin (Wisconsin DNR 2002a).

Ecologically, the Rock River is located within the Prairie-Forest Border Eco-region that dominates southern Wisconsin and extends into Illinois, Iowa and Minnesota. Oak savanna and prairies were the most common plant communities found in the Rock River Basin at the time of European settlement. Some southern deciduous forests dominated by sugar maple, basswood, and various oak species existed in what is now eastern Dodge and Jefferson Counties. Pre-settlement vegetation was greatly affected by fires, many set by Native Americans, and these fires favored the prairie-oak ecosystems at the expense of other trees and brush (Wisconsin DNR 2002a).

There is a large variety of geographically distinct terrestrial communities within this region, however, including wetlands providing valuable ecological services such as flood control and nitrate filtration (Wisconsin DNR 2002a). Most of the Rock River Basin is located in the Eastern Glacial Plains, while only about 5 percent is located in the Central Sand Hills Ecological
Unit in the northwest. Soils are generally fertile, ranging from shallow, mineral soils to very rich organic soils, to sand and gravel deposits up to 300 feet thick. Soil texture ranges from very permeable sand and gravel to tight, impermeable clays (DNR - Rock River State of the Basin Report on RCC website).

Prior to European settlement, the Rock River consisted of thousands of acres of wetlands. These wetland ecosystems varied from shallow wet meadows to lowland wet forests and even deep-water marshes. The DNR estimates that over 47 percent of Wisconsin’s wetlands have been filled and ditched over the years for agricultural and urban development. Because the southern
part of Wisconsin has seen greater development pressures in its urban areas than other regions of the state, this figure is estimated to be even higher there (Wisconsin DNR, 2002a).

Like many waterways in the region, the Rock River has hosted a variety of Native American cultures. The Horicon Marsh is one unique feature of the Rock River that has records indicating habitation from every major pre-historic Indian Culture. The Woodland Culture, or mound builders, inhabited the Rock River Basin in this area as long ago as 3000 year BP. The Ho-Chunk, Sauk, Fox and Potawatomi lived in the Rock River Basin until about the middle of the 19th century (Rock River Coalition website, 2008).
3. Water Quality and Hydrological Problems

Water quality in the Rock River Basin has been severely impacted by point-source pollution, but non-point source pollution originating from agricultural and urban landscapes has been the bigger problem. The DNR reports that only a handful of streams and lakes within the Rock River Basin can be rated as having excellent water quality. Hydrological problems caused by human development are also common; as stream channelization, drainage ditch creation, and wetland drainage activities have increased flood severity and frequency. Despite these problems,
drinking water in the Basin is generally considered excellent, with some contamination occurring in certain areas due to agricultural and industrial chemicals. Because all of the water in the basin is supplied by private and municipal wells, protection against groundwater contamination is a high priority, especially considering the interconnections between ground and surface water (Rock River Coalition website, 2008).

The DNR reports that in 1991 the four counties in the Lower Rock River Basin; Jefferson, Dane, Rock, and Walworth ranked in the top ten for nitrogen loading in the state of Wisconsin. Jefferson County had the highest nitrogen loading in the state at that time, while Dane, Rock, and Walworth counties were ranked fifth, eighth, and ninth, respectively. The DNR reports that the primary water quality and quantity issues in the basin are:

(1) Altered stream and groundwater hydrology
(2) Continued loss of aquatic and riparian habitat
(3) Sedimentation of streams, lakes and ponds
(4) Nitrate and pesticide contamination of groundwater
(5) Increased quantity and reduced quality of storm water runoff.

It is noted in the DNR report on the Rock River that the sources of these problems are “complex and interactive,” but most of the problems can be traced back to land use changes. Land use patterns have shifted away from rural and towards urban uses, and the concurrent increase in coverage by impervious surface area has greatly altered the regional hydrology (Wisconsin DNR, 2002a).
4. Collaboration in the Rock River Basin

The Rock River Coalition is a basin wide, non-profit organization whose mission is “to educate and provide opportunities of diverse interests to work together to improve the environmental, recreational, cultural, and economic resources of the Rock River Basin (Rock River Coalition website, 2008).” The Coalition works closely in collaboration with two other organizations, the Wisconsin Department of Natural Resources (DNR) and University of Wisconsin-Extension, to take action on natural resource problems within the Rock River Basin.

Figure 5.6 – Discharge into the Rock River near Watertown, WI
The Rock River Coalition was organized in 1994 and incorporated two years later into a 501c(3) non-profit group (educational and scientific) whose goal was to do extensive strategic planning of important goals and activities. It was in 1996 that the Rock River Coalition became a key supporter of a preexisting watershed group, the Rock River Partnership, and by 1997 the Rock River Coalition expanded its area of focus outside of the Rock River Corridor and into the entire basin (Rock River Coalition website 2008).

In 1998, the Rock River Coalition became part of a program of large basin partnerships set up by the Wisconsin Department of Natural Resources (DNR) in the late 1990’s under former director George Meyer. The Wisconsin DNR began to develop basin partnerships for the state’s
23 large river basins. It was also about this time that the Rock River Coalition agreed to be
DNR’s partner team for the basin, and citizen input via surveys and an open forum was
conducted in order to identify the most important issues in the basin. Today, many of the basins
from the original DNR basin program exist in name only, as much of the effort has not been
sustained. The Rock River is one notable exception (the SE Fox is another). It has thrived
mostly due to prior efforts, effective leadership, and assistance from the DNR (Rock River
Coalition website 2008).

Figure 5.8 – “Friends of Allen Creek” Facilitator – Allen Creek Watershed, Rock River
Tributary near Lake Mills, WI
By 1999 the Rock River Coalition had developed actions plans with six issue teams for the purpose of addressing the top most critical issues identified in the 1998 needs assessment. Today, there are five issue teams working within the Rock River Coalition. These five issue teams are: Groundwater, Planning the Rock, Storm Water, Water Quality, and Wetland and Shoreline protection. The issue teams are composed of individuals from organizations, government agencies, private businesses, and general citizens, and are volunteers from the area (Rock River Coalition website 2008).

In 2001 the Rock River Coalition merged with the Rock River Partnership, working mostly through the water quality issue team. The Rock River Partnership was an alliance of 62 wastewater treatment plants, industries, organizations, county agencies, and state agencies that investigated the idea of using nutrient trading as a low-cost method for improving basin water quality (Rock River Coalition website 2008).

The fact that the Rock River Coalition has been in existence since 1994, a long period of time for watershed organizations, and due to the benefits derived from other institutions such as the Rock River Partnership, the collaborative effort in the Rock River region has had advantages that many other watershed partnerships have lacked. In addition, scientific knowledge and capacity building derived from organizations such as the University of Wisconsin – Extension Service and other local colleges and government agencies, has been a big factor in the long-term sustainability of the Rock River Coalition. Finally, high quality leadership along with neutral facilitators has been able to increase trust and maintain a high level of interest in partnership activities (Rock River Coalition website 2008).
There were several reasons I chose the Rock River Coalition (RCC) for study, the first being the relatively long time the RCC has been in existence. Second is the success this watershed partnership has achieved in sustaining its efforts within the watershed. Third is the fact that several smaller-scale groups are nested within the Rock River Basin which allowed me to investigate the role of scale.
6. **Rock River Focus Group**

The Rock River Focus Group was made up of five volunteers that were contacted through the internet from the Rock River Coalition email list. These people are all involved in the Rock River Coalition in some capacity, but it should be noted that the Rock River is a voluntary non-profit organization; not only are the focus group participants volunteers from the perspective of my focus group, but they are also volunteers in the larger partnership itself. The voluntary nature of the participants is important in that generalizing to a larger basin citizenry may be problematic. Still, these volunteers are knowledgeable about the workings of the partnerships and the critical issues and limitations with regards to legitimacy. Also, as mentioned earlier, the volunteers are all people who have access to computers and email, and thus reflect some measure of bias. The five Focus Group participants will not be named here in order to protect their privacy, but there organizational affiliations are listed in order to provide a more complete rundown of their background:

**Participant A** = Rock River Coalition Board Member and employee of an Educational Institution

**Participant B** = Former Member of the Wisconsin DNR and now Private Consultant

**Participant C** = Local Citizen and member of a smaller watershed group nested within the Rock River Coalition

**Participant D** = Local Citizen and member of a smaller watershed group nested within the Rock River Coalition
**Participant E** = County Employee working on Conservation Issues within the Basin

7. **Rock River Hypotheses: Themes and Indicators**

As mentioned in the focus group methodology section, qualitative analysis as described by Bereleson (1951) and others relies on the scientific method of hypotheses development and testing, and the themes and related indicators (communication content) found within the focus groups should support or detract from these hypotheses. In this paper, the hypotheses were derived from supporting indicators (focus group content), but there is no attempt here to use these indicators to prove or disprove the hypotheses. Rather, the indicators are used to discover hypotheses that can be tested in future research over a broader spectrum of respondents and watersheds. Important issues and problems related to the legitimacy of watershed management organizations will be brought to light in the form of hypotheses that can be tested through future research. For now, the indicators will serve as evidence that these hypotheses are worth investigating. There were three sources of indicators used in this paper to help formulate the hypotheses: (1) an extensive literature review, (2) initial impressions from listening to the focus group discussions, (3) reading the focus group transcripts. Again, the indicators in my case, unlike other qualitative analysis studies, were used to formulate, not test, the hypotheses. Testing these hypotheses would have to be a task for future research, reaffirming the exploratory nature of this research. I have laid out the major hypotheses developed from the sources described above, and these are listed below. First, I have listed the major issues that helped form these hypotheses as ferreted out of the literature review or the focus groups.
It should be noted while my hypotheses were derived from one of my three sources -- literature review, my initial impressions of the focus group, or careful qualitative analysis of focus group transcripts -- the topics introduced for discussion in the focus groups initially came from my interpretation of prior research. Due to time constraints in the focus group, I could not bring up all the key elements of legitimacy that I desired to discuss, and I also wanted to leave time for free input of topics by the participants. So the list of topics and hypotheses developed here are certainly not complete, but do represent some key issues regarding the legitimacy of collaborative efforts within the Rock River Basin. The content of the communication from the
focus group participants, or "indicators, as Berelson calls them (1951), certainly supports the formulation of hypotheses developed here as I will demonstrate later in this section.

**Participation: Inclusiveness and Diversity of Representation**

**Hypotheses 1: “Diversity of Participation is an Ongoing Problem in the Rock River and is affected by Three Factors: Turnover, the Voluntary Nature of the Group, and Scale.”**

**Themes: Inclusive Participation and Diversity of Participation (Quality Representation)**

I initially asked my participants questions regarding the inclusiveness of participation in the Rock River Coalition and other nested watershed groups in the basin (two of my participants were members of a smaller group nested within RCC). It was soon discovered that watershed partnership participants represent a diverse range of occupations, but demographic diversity was rather homogenous. Most participants were white and well-educated, and many had a prior professional interest in the issues of water quality and resource conservation due to their careers. In other words, many lower income, working-class people and minorities were typically not involved in watershed group activities. The first sub-hypothesis is listed below. Five factors were determined to be affecting the diversity in watershed group participation: turnover rate, type of watershed group, education, proximity to the water, and leadership.

**Indicators: Diversity of Participation**

The content of this focus group communication was clearly orientated toward the theme that the Rock River Coalition, while attempting to involve a broader group of participants, was
not very diverse from a socioeconomic point of view. Most of the participants are white males
with a high degree of education, although one focus group participant noted that the watershed
citizenry is itself mostly white. Some of the indicators within the content of the communication
that support this conclusion are shown below. The overlay analysis of census tracts in the Rock
River watershed showed a similar make-up of citizens regarding race, but not for income and
education. The watershed participants had a much higher level of education and income than the
average citizen in the watershed. This will be discussed in more detail below.

The issue teams, however, were seen as more diverse than the board, according to the
focus group participants. One focus group member pointed out that many minority populations
are overrepresented in lower income groups, and often typically work longer hours in lower
paying jobs and thus have little money or free time to engage in watershed group activities. It
was also pointed out that farmers were also underrepresented in these watershed collaborations,
again possibly because they work such long hours and also do not have the time to participate.

As mentioned above, the board was diverse regarding their occupations, but not for
gender, education level, and socioeconomic status. For these demographic factors the board was
very homogenous. Below is an indicator illustrating the occupational diversity of the board.

“Our president is a woman, has been an activist, She’s been the president of the state
association. We have a farmer, we have a transportation consultant, we have a water
resources engineer. We have two that work for banks, one is a vice president of a trust
association, the other works as a tax specialist, so in a way we are pretty diverse
(occupationally) --- we work hard to get diversity.”
But even so far as occupational diversity, it was mentioned that getting more farmers to participate in the watershed group was difficult, as shown in several indicators listed below.

Another focus group member stated,

“So we haven’t had a very diverse program to this point. It is offered to any citizen but there is not much diversity.”

Other indicators related to diversity of participation can be seen in Appendix C.

**Indicators: Turnover and Diversity of Participation**

Turnover was a factor that helped determine the diversity of group participation. Turnover to some extent is seen as positive in that it assists in attaining a more diverse group of participants, even though it may hurt the continuity of the effort. Listed below are some communication content indicators regarding turnover.

“and sometimes they (participants) just go away.”

“The coalition (Rock River) has almost been the same board for 10, 12 years, and that was actually getting to be a problem because they had done so much work early that they were mentally, you know, connected, but they were not physically connected. I’m the only one that’s been around for a while.”
“Now we have a different board than we did four years ago, and I think a very good board that is taking more leadership in some of the stuff than I have seen in four, five, six years.”

**Indicators: Voluntary Nature of the Group and Diversity of Participation**

Because watershed organizations like the Rock River Coalition are voluntary, the participation in these groups tends to be biased towards people who have a greater interest in the work of these types of partnerships. Below are some indicators from the focus group supporting the idea that people who participate already like the purpose and goals of the organization, and have a positive attitude towards the group in the beginning.

“There is a big difference between these two types of organizations in terms of diversity because in the association (board of the lake association versus the board of the lake-district – a taxing body) people self-select whether they want to join.”

“So there is very little diversity in that group for that point of view. That’s the association where people voluntarily say I like the goals and purposes of that organization.”

“We collect people of goodwill” (self-select for people of goodwill).”

“The coalition is a membership organization. People choose to come.”
**Indicators: Scale and Diversity of Participation**

As mentioned earlier, the Rock River Coalition is a large-scale, basin level organization. As such, the size of the scale greatly affected the level of participation. Below are indicators illustrating how the large scale of the basin group diminishes participation, and thus diversity of participation, due to the large driving distances required for those wanting to attend meetings. This was mentioned above especially for those of meager economic means, such as lower income minorities. In addition, the issues tackled at the basin scale are often of much less concern to citizens than the problems encountered within a smaller, more local watershed. These local concerns are more salient and thus produce a greater degree of interest and participation than some of the bigger issues addressed at the basin scale. It should be noted that more than one meeting was often done for Rock River in order to ameliorate the effects of large driving distances and thus facilitate better participation. Below are some indicators supporting the idea that a large basin organization naturally suffers from lower participation diversity than smaller watershed groups.

“It’s difficult when operating a basin that’s big to get people to drive to attend open houses.”

“In a small watershed you get people and you get a chance to work with them, help them out, help you do stuff.”

“It is very challenging to recruit people to be a member of a basin-wide organization, and it wasn’t even the gas money then.”
The indicator below, not only shows the disadvantage of the basin scale regarding participation diversity, but suggests a solution to one problem related to participation at this scale: holding more than one meeting at different locations within the basin. Holding two meetings seems to work well for getting better participation.

“So in terms of staffing and running meetings, we should have one but it never works because it is too big a basin. “

Other indicators showing challenges facing large basin organization regarding participation can be seen in Appendix C.

Trust and Context: Overcoming Past Mistrust

Hypothesis 2: “Context of the Watershed, particularly Prior Institutions and Prior Levels of Trust, Play an Important Role in Collaboration between Stakeholders, and Overcoming Past Levels of Mistrust towards Government is an Important Challenge.”

Themes: Trust and Context

In the book “Swimming Upstream (2005)," Sabatier and his colleagues discussed the importance of context when analyzing the effectiveness of watershed collaborations. In the Rock River, context was found to be particularly important for two reasons: the existence of another watershed group known as the Rock River Partnership, and the distrust towards the Wisconsin Department of Natural Resources. Regarding the latter, several indicators pointed to a high level of distrust towards the DNR over the years.
Indicators: Distrust of the DNR, Specifically from Farmers, Hinders Collaborative Efforts

In several cases, landowners would refuse to cooperate in watershed efforts due to distrust of the DNR. In addition, there was a high level of distrust generally from farmers towards any official agency actions, be they DNR or watershed collaborations. However, the last two indicators shown below illustrate how efforts in the Rock River Coalition are slowly regaining some of that lost trust and getting stakeholders to cooperate a bit more in collaborative efforts.

“I don’t want to talk to you—you screwed me!”

“The landowner said I don’t want to talk with him because you get money from the DNR.”

“They’re sure because of things that happened in the past with condemnations----people remember that---even if you’re dealing with it as a willing seller in a collaborative method----they don’t believe it.”

“The Rock River ---- not going to change their minds about the DNR. But, if as a group --- little project here and there -----we might soften them up a bit.”

“They had zero trust with the DNR, but over two years they got a level of trust that the wastewater treatment plant folks told me they thought they never would get.”
Other indicators dealing with trust can be seen in Appendix C.

**Consensus: Time Constraints, Contentious Issues, and Stakeholder Preference**

**Hypotheses 3:** “Consensus Faces Challenges Regarding Time Requirements and Avoidance of Some Contentious Issues, but is preferred by most Watershed Group Participants.”

**Theme: Consensus: Problems and Promises**

Consensus decision making is typically a part of most collaborative resource management processes, but as I noted in the literature review there is some debate about the need for, or even the benefits of consensus. I purposely brought up the topic of consensus in order to investigate its role in the collaborative process in the Rock River Coalition. Generally, the focus group participants endorsed consensus but were frank about some of the drawbacks to this type of decision-making. One of the biggest complaints came mostly from stakeholders in the business community who were used to taking a vote and thus quickly making a decision via majority rule. These business stakeholders did not have the patience to engage in a long and drawn out deliberation in order to get all stakeholders to agree. It was noted by some of the focus group participants that some business people dropped out of watershed activities because of their impatience with the time required for achieving consensus-based decisions. In this way, consensus works against diversity of participation described below, exacerbating that problem.

Another drawback to consensus was the idea that sometimes contentious issues are avoided in the deliberation process because achieving consensus would be difficult or even impossible. This was one of the criticisms of consensus mentioned in the literature as well,
something that some authors referred to as “least common denominator” decision-making.

Below I have listed some of the Indicators that support these conclusions.

Still consensus seemed to be the preferred method of decision-making in this basin, and most focus group participants talked about how it was a more “powerful” way to determine an outcome. Most of the focus group participants felt that consensus was the only way to go, and without it the collaborative watershed approach simply would not work.

“I have found that there are people that just don’t get it (consensus) ---- don’t understand why there isn’t a vote-----ones from business backgrounds----they’re used to a boss telling them what to do-----it’s kind of a strange approach to consensus decision-making.”

“I have had some business people on different groups, not on the same project ---they decided they can’t work this way (consensus) and they leave.”

**Indicators: Time-Consuming Nature of Consensus Reduces Participation**

The conflict between the consensus mode of decision-making and the desire to increase participation in watershed groups was evident in this focus group. This conflict centered on the perception of many that consensus reduces participation due to the time-consuming nature of the process. Below are some indicators from the focus group that serve as evidence of this problem.
“Having been in business you think it’s too time-consuming. I was in private business. I feel that would be ‘why aren’t we getting at this and deciding?’

“They (people from a business background) want to move right away. They don’t have the time, they don’t have the patience, and it takes time and patience for consensus decision-making.”

“(People) get impatient over time--they don’t recognize the power of that (consensus), the power of that kind of decision-making.”

**Indicators: Consensus Decision-Making Avoids Contentious Issues**

The literature review on legitimacy and watershed organizations uncovered the idea that consensus often leads to the avoidance of contentious issues (Coglianese 1999). There was little agreement with this concept in the focus group volunteers, but one comment supporting this idea is listed below.

“But it’s not under our purview to take on some really, heavy contentious type issues that a group in authority would take on.”
Indicators: Consensus Decision-Making Does not mean Total Unanimity, but rather Consists of a Decision that Everybody Could “Live with”

Also, it was discovered that consensus in the Rock River Basin, like many watershed groups investigated in the literature, did not rely on consensus in the strict sense of complete unanimity, but rather consisted of an outcome that everybody “could live with.” Other themes related to consensus and some of the supporting indicators are shown below. Other supporting indicators for these themes can be found in Appendix C.

“Seldom have votes that are unanimous.”

“How we can move together.”

“You were okay with it.”

“You could live with it.”

Indicators: Consensus Produces More Pragmatic, Useful and Powerful Results

Despite criticisms about the time required in the consensus decision-making process, and the fear that contentious issues might be overlooked, most survey respondents embraced
consensus and believed that it resulted in more pragmatic and sustainable agreements. Below are a few comments from the focus groups that support this.

“More powerful in terms of pragmatic and useful results”

“Your objectives (for Friends of Allen Creek), your bylaws, your mission statement, all of

“that was consensus ---- so all the important policy things were consensus.”

Fairness: A Deliberative Process Enhance Just Outcomes

Hypotheses 4: “A Fair and Deliberative Process is required for Just Outcomes and Respect for all Parties, which sustains the Collaboration over the Long Term.”

Themes: Fairness, Deliberation, Respect and Fairness

Fairness is an element of legitimacy that is closely linked to trust. Many times fairness is discussed with regards to the process rules governing collaborative efforts. A fair process is extremely important for establishing just outcomes, however, and thus two major types of legitimacy: process and outcome, become inherently linked together. Another concept linked to fairness is the idea of respect for all parties. Fairness in the process maintains or enhances this respect, furthering trust and leading to outcomes that are perceived as just. Just outcomes are more sustainable and this is why watershed groups such as RCC are able to survive over a long time. The links between fairness, respect, trust, and just outcomes show how interconnected these elements of legitimacy are within the RCC and other similar organizations.
Indicators: Fair and Inclusive Deliberative Process: Links to Trust, Respect, and Just Outcomes”

The focus group participants in the Rock River were asked about fairness and this generated quite a bit of discussion regarding its role in sustaining what has been a very long collaborative effort within the Rock River Basin. A fair process was seen as one that was good at involving key stakeholders, sticking to transparent process rules, and deliberating in an open manner using fair and impartial facilitators. Here we see how effective and neutral leadership is important to fairness. The role of leadership will be discussed in more detail below. I have listed some indicators from the content of the focus groups which supports the themes of fairness, respect, and deliberation. These themes in turn advance the cause of just and sustainable outcomes in the Rock River.

“We work on storm water programs where we bring in people from all different communities and consulting firms to talk about what needs to happen in the basin for storm water collaboration.”

“Our goal was to bring people together.”

“We could really disagree and go at loggerheads and not be disagreeable.”
Leadership and Neutral Facilitator

Hypotheses 5: “Strong Leadership and Neutral Facilitators are Keys to Successful Collaboration in the Rock River.”

Theme: Leadership and Neutral Facilitators

One of the topics brought up by the focus group participants was the importance of leadership in sustaining the watershed collaboration. In the Rock River, the Coalition leaders were experienced in watershed collaborations as was the University of Wisconsin – Extension, one of the key partners within the RCC. In addition, the leadership, consisting of the Board of the Rock River Coalition, was viewed as fair and neutral with no hidden agendas. This enhanced the key concept of trust describe earlier, while also facilitating another element of legitimacy closely tied to trust --fairness. A fair process is required for legitimacy, and the leadership within an organization can play a key role in facilitating such fairness. Conversely, leadership that is biased towards one stakeholder group or another, or who have hidden agendas, can detract from the collaborative mission of watershed groups.

Indicators: Leadership and Neutral Facilitators Enhance Watershed Processes

In the Rock River, leadership was seen as positive factor in enhancing the long-term success of the RCC. It was mentioned that strong leadership by people on the board, the director of the board, and representatives of various agencies like DNR and UW-Extension all had a positive impact on the Rock River Coalition. The term “strong” leadership was mentioned and used as a reason why the Rock River Basin collaboration was working so well, whereas some of
the 23 basin groups in Wisconsin set up by the DNR under former director George Meyer were not faring so well. So, the leadership was seen as not only fair and impartial, with no hidden agendas, but it was perceived as being strong and effective in advancing the goals for the RCC. In addition, it was mentioned that having good “vision” on the part of leaders was important, and that articulating that vision was even more critical.

In conjunction with strong leadership was the role of science and scientific experts, many of whom are from the same institutions providing leadership. Capacity building is important for watershed collaborations, and the Rock River Basin had several organizations providing such capacity -- as well as benefiting from the professional and scientific expertise of many individuals who had volunteered to work on RCC. The role of science and the use of local knowledge, at both small and large scales, will be discussed further in this paper. Below I have listed some indicators from the focus group communication that provides evidence for the hypotheses that strong leadership and neutral facilitators are major factors in attaining goals and sustaining the collaborative movement in the Rock River. Others are listed in Appendix C.

“and some basins never did (organize an official partnership based on river basins as directed George Meyer)” because leaders did not buy into it.”

“They (the Board members) would show up at an even but not necessarily take over the leadership of the event. There was one thought, probably there for wise counsel.”
“Now we have a different board than we did four years ago, and I think a very good board that is talking more leadership in some of the stuff than I have seen four, five, or six years.”

Capacity Building: Role of Science, Local Knowledge, and Scale

Hypothesis 6: Capacity Building Enhances Legitimacy and Consists of Both Scientific Experts and Local Knowledge. Scale determines which one Dominates and which Issue is the Primary Focus

Themes: Capacity Building, Role of Science, Local knowledge, and Scale

Capacity building is very important in the Rock River, as mentioned above, with various agencies such as UW-Extension, University of Wisconsin-Whitewater, and the DNR having input into processes and implementation projects. In addition, various individuals who have volunteered to serve on the Rock River Coalition have levels of expertise in different disciplines that assist them in their duties on the Board. These experts and professionals make up the scientific expertise mentioned as an element of legitimacy in the literature review. Because watersheds make up such complex systems, the role of science becomes critical if these groups have any chance of success.

However, within the same literature on watershed collaboration is the idea of using local knowledge in order to enhance the legitimacy of the effort. Scientific experts are great but these collaborations should not ignore local knowledge, and every effort should be made to include such knowledge from the very beginning when delineating the important issues to address and devising strategies for action. The Rock River has also utilized such local knowledge as
described in the section on the history of the collaboration. In 1999 issue teams were set up in
the Rock River to determine the most salient problems that needed immediate attention, and
action teams were set up around the same time to devise strategies for these problems.

Many of the members of the issue teams would not be considered scientific experts and
are referred to as “citizen monitors.” These issue teams do generate important scientific data via
monitoring, however, and are an important cog in the capacity building apparatus of the Rock
River. Because the issue teams are not often experts they would better fall under the concept of
“local knowledge.” The trade-off between scientific expertise and local knowledge is often at
the root of discussions about legitimacy in watershed collaborations. Typically, the use of both
local knowledge and scientific expertise is called for, and in the case of Rock River it appears
that scientific expertise and local knowledge are combined rather effectively.

One factor that seems to greatly affect which type of knowledge dominates is scale. At
the smaller watershed scale where the monitoring efforts of the issue teams are strong, local
knowledge appears to be the main type of information base. In the larger basin scale, however,
the resources of the various government agencies and academic experts appear to be the major
source of knowledge. In addition, decisions regarding which issues to address vary according to
scale. Local concerns are the major issues addressed in the smaller scale, as one would expect,
whereas basin-wide problems capture more attention when operating at the larger scale. It was
also pointed out that successful implementation of smaller projects at the watershed scale is more
easily achieved than some of the larger, cross jurisdictional programs that are often the main
focus of the basin group. This is one major advantage of the smaller watershed groups.

In the Rock River, work at the two scales seemed to mesh well, resulting in a model that
is often referred to as the “nested scale.” The smaller scale watershed groups and issue teams are
nested within the larger Rock River Basin. The Basin group and its governmental and educational partners provide leadership, funding and scientific expertise from the top, whereas the issue teams provide monitoring and assist in implementation of projects at smaller scales. The local groups focus on more salient local issues which stimulates greater participation as described earlier, and their local knowledge base and monitoring efforts provides a bottom up approach that cumulatively and positively affect the goals of the basin. So the nested scale approach seems to provide a “bottoms-up meets top-down” type of operational strategy.

Finally, as mentioned in the literature review, there are sometimes concerns that a desire to achieve consensus can cause an avoidance of contentious (but important) issues because participants are too focused on achieving consensus. I mentioned this briefly when I lead the focus group and did get one comment that supported this idea, but obviously more evidence would be needed in order to verify this as an ongoing and significant problem. Below are a couple of indicators that illustrate capacity building and its relationship to legitimacy. Some other indicators are shown in Appendix C.

**Indicators: Capacity Building and Legitimacy – Scientific Expertise and Local Knowledge**

The first set of indicators from the focus group supports the formulation of the hypotheses that leadership and capacity are major factors in attaining goals and for sustaining the collaborative movement in the Rock River.

“We have a citizen-monitoring program.”
“We kind of pull it together a program so we can offer training (Rock River Coalition).”

“We have a thing called confluence, a gathering of monitors.”

Indicators: Scientific Knowledge and Local Knowledge – Scale Effects and Issues

Addressed

The second set of indicators listed relates to the hypothesis that scale has a significant effect on the decision to use local knowledge versus basin-wide scientific expertise. Most of the communication of the focus group showed that smaller scale watershed groups rely more on local knowledge, whereas as the basin group (RCC) is heavily dependent upon scientific expertise. These same indicators below, however, will also show that the two scales are effectively used here, and that the utilization of both local knowledge and scientific expertise was fairly well coordinated.

“When you work at the scale of the basin you tend to work on bigger issues that cross jurisdictional boundaries.”

“There are things at the small level every once in a while I’d say, you know, I want to be part of one of these small groups because you get local studies, local work done, you’re doing local stream cleanup.”
Information Exchange: Education, Outreach and Awareness

Hypothesis 7: Education and Outreach Facilitate Greater Interest and Participation in the Watershed Collaborations, and are Affected by Scale and Issues.

Themes: Education, Awareness and Outreach – Tools of Information Exchange

The positive role that education and awareness had on participatory interest was repeated often by members of the focus group. These two components of information exchange are at the heart of many watershed planning groups and other natural resource collaborations. Educating people on the concept of the watershed and instructing them on how land use activities are linked to water quality is a large task by itself. A more difficult goal is getting people interested enough to become involved in what is primarily a voluntary effort at protecting a vital resource. The education and outreach efforts were numerous and sophisticated. It should be noted, however, that these efforts appeared to be effective from a communication standpoint, but I could not determine if they were effective in changing behaviors or convincing land owners to install best management practices. That would entail a survey of respondents on their behavior, rather than attitudes. Such a survey would be the focus of another research project. Nor could I say if water quality improved due to these information exchange activities, not having done a biological assessment over time in the affected waterways.

The main information exchange mechanisms utilized in the Rock River were meetings, newsletters, newspaper articles, and various materials developed by the University of Wisconsin Extension in Jefferson County. The educational efforts of UW-Extension were critical to the
education and outreach campaigns for the Rock River. The leadership at UW-Extension, along with that of the Wisconsin Department of Natural Resources (DNR), was strong and effective. It was cited numerous times by members of the focus group as a reason for the success of RCC. This strong leadership, which was instrumental in driving education and outreach efforts, appears to be one major reason why the Rock River, along with the Southeast Fox described below, have successfully incorporated the watershed approach into their resource management efforts. It was also mentioned in the focus group that the concept of a "vision" for the watershed was important, and that leadership within the RCC, UW-Extension, and DNR, should be given credit for conceptualizing and laying out that vision for participants and residents.

As mentioned before, the Rock River Coalition was good at coordinating efforts at both the smaller watershed scale and the larger basin scale. The nested hierarchy approach was very successful, and was enhanced when decisions on the mechanisms chosen for use revolved around the scale of the effort. It is important to note that the salient issues often determined the best scale of effort. The scale would in turn determine the type of information mechanism required to disseminate information about that particular problem. Face-to-face meetings with local watershed leaders were more common at the small scale than it was for basin-wide problems. News articles in local papers were better suited to regional problems that extended beyond the boundaries of any small watershed and were therefore of a greater concern to readers in that region. The relationship between education and outreach, issues of importance in the watershed, and issues of scale, can be seen in the simple schematic model shown below (Figure 5.10).
So the link between the three themes of issue, scale, and information exchange as seen above is critical to the attainment of legitimacy (Figure 5.10). The model shows a circular relationship because education and outreach can change opinions enough to alter people's perceptions of what issues should be addressed first. However, this effect is probably less intense than the issues' effect on scale, or how scale determines education and outreach mechanisms. Below are a few indicators used to develop the hypothesis about the role of information exchange. There are a few others listed in the back of this paper in Appendix C.
Indicators:  Education and Outreach - Information Exchange Tools Affect Issues and Scale

Below are a few sample comments made by focus group members who emphasized the need for comprehensive information dissemination and exchange, as affected by scale.

"I wrote a plan and took it to the public for comments ----- we made a concerted effort to get information about this proposed plan out to the public."

"We had a series of meetings around the basin to get information."

"And if you have good vision and can articulate that vision."

The Role of Government: Potential and Limits to Regulation

Hypothesis 8: The Proper Role of Government and Regulations in Watershed Collaborations is Undefined, and is seen as a both Positive and a Negative Factor Depending on the Particular Stakeholder.

Themes: Role of Government and Regulations:

It was mentioned above that a high level of distrust toward government, particularly the DNR, existed within the Rock River Basin and that concerted efforts were underway to dispel some of that past mistrust. Because of that prior distrust, some stakeholders in the watershed felt the DNR and other government agencies should have a smaller role in watershed collaborative
efforts. However, communications from the focus group showed a different viewpoint towards the role of government agencies such as DNR, and regulations in general. Some of the focus group participants related experiences whereby watershed residents were indignant over the lack of greater regulation, particularly activities on the waterways such as boating. These people were surprised to learn the DNR had no regulatory authority over such activities and expressed a belief that more regulation was necessary to limit such activities.

So, the view towards government involvement and regulation cuts both ways, with some people resenting governmental interference and expressing a desire to have less governmental regulation, and some advocating for greater regulation on the part of different agencies. The governmental agencies almost appear to be in the middle, with stakeholders on either end of the spectrum arguing for more or less regulation. It seemed that the role of government, although important from a capacity building and funding perspective as described earlier, is poorly defined with regards to its use of regulation to ensure compliance of watershed recommendations.

In addition, regulatory authority is sometimes fragmented and disjointed within such a large basin as the Rock River. Much of the authority is local, but state agencies and federal laws definitely play a role. The exact nature of that role within watershed collaborations, however, is not easily identifiable with regards to regulation. This is especially true with regards to land use, which is so critical in improving and protecting water quality due to the critical connections between land activities and water bodies. One focus group participant (see indicators below) expressed a desire for more land-use control at the county level in order to protect water resources. There seems to be a need to reconcile the political authority of state and federal agencies with the local authority of counties and towns within the framework of watershed collaborations, and to more exactly define the proper level of regulation desired of such agencies.
Indicators: Role of Government and Regulations (see Trust for Additional Negative Opinions on the Role of Government)

The desired level of regulatory authority will change according to the context (history) and the individual stakeholder. With regard to the Rock River, the past history of distrust towards the DNR is countered by perceptions by some that more regulatory authority is needed to manage activities occurring on the water. A few indicators for this hypothesis are shown below. More indicators can be seen in Appendix C.

"People said you should stop them from doing that. That was not within our power to do that."

"We're experiencing death by a thousand cuts because we don't have good regulatory power in the area."

"But it's not within our purview to take on some of the really, heavy contentious type of issues that a group in authority would have to take on."

Scale and the Watershed Approach

Hypothesis 9: Scale is Key in the Watershed Approach, and the Rock River Coalition Effectively Coordinated Efforts at Small and Large scales by using a Nested Scale Hierarchy. This Hierarchy was Critical in determining the Proper Scale of Effort depending on the Issue.

Themes: Use of the Nested Scale in the Watershed Approach
The watershed approach paradigm underlies most watershed collaborations in the United States and elsewhere. It is basically a place-based strategy that typically relies on a multi-scale and multidisciplinary effort. As such, understanding the correct scale for addressing particular issues is important. The Rock River Coalition, according to focus group participants, was very successful in coordinating efforts at both the smaller watershed scale and the larger basin scale. As was described above for education and outreach, the type of issue often determined the best scale for dealing with that issue, which in turn dictated what information-exchange mechanisms would be most effective.

The resources of the large basin group (RCC) were made available to the smaller watershed groups like Friends of Allen Creek when necessary, and monitoring of stream quality and face-to-face meetings at the smaller scale contributed to the overall goals of the larger basin group. In addition, the scale helps determine the proper mix of local knowledge and scientific expertise as discussed earlier, but both can be helpful at either the small or large scale. It was bottom-up meets top-down at its very best, and represents a key achievement for basin groups like the Rock River Coalition and the SE Fox Partnership to the east. This appears to be one reason why these two basin organizations function so well and remained in existence, unlike some other major basin groups in the state of Wisconsin.

I could only speculate as to how well basin organizations working over a larger scale, such as the Mississippi Basin, would do with regards to collaborative management, but it seems that successes seen in some of the larger basins in Wisconsin regarding capacity building and coordination at different scales (the nested scale approach) could also be successful within very large river basins. In Wisconsin roughly half of the basin organizations set up in the 1990’s under the DNR have disbanded or are inactive, but the Rock River Coalition and the SE Fox
Partnership are obviously two examples that have succeeded.

**Indicators: Use of the Nested Scale in the Watershed Approach**

Below are some indicators from the focus group that helped form my hypothesis that the nested scale effort here was fairly successful. Some of these indicators were used before as evidence regarding the role of local knowledge and scientific expertise.

“For example, other than people in the furthest reaches of the watershed, you don’t control your destiny. You can work locally but if one of the major benefits to your area would be wetland restoration, you could do everything in your small area and it is going to affect your destination.”

"It's (Allen Creek) so tiny I feel like I could study it and get a handle on it."

"We kind of pull together as a program so we can offer training (Rock River Coalition). We have a thing called confluence, a gathering of monitors."

"When I work with small groups like Friends of Allen Creek or Friends of Fish Creek, you get more citizen involvement and more hands on activities."

"We (Rock River Coalition) pulled together 30 some different communities, municipalities, counties, cities, towns, nonprofits, lake districts, to help fund a
groundwater model---a small group like Friends of Allen Creek, that would be outside of what they could do----they could not support it, not financially, but they will be able to utilize the model when it is done."

8. Conclusions

In doing the qualitative analysis of the focus groups, I tried to be as objective as possible despite the fact that the title of this dissertation is focused on threats and problematic issues related to the legitimacy of watershed collaborations. I did take note of the many successes of this watershed group, which was chosen partly based on its longevity and successes. There were many successes within the Rock River Basin, and I will summarize some of the major ones here.

Effective capacity-building achievement resulted from the scientific expertise and funding resources contributed by participating state agencies, particularly the UW Extension Service and the Department of Natural Resources (DNR). These agencies also provided top-down leadership not only for the Rock River Coalition (RCC), but for the smaller watershed groups nested within the RCC. This was corroborated by individuals working with Friends of Allen Creek, one of these smaller organizations within the Rock River basin. A similar watershed group in the same area, Rock River Partnership, also provided expertise and knowledge that aided RCC in their efforts to control point and nonpoint source pollution. Leadership within the RCC was seen as very strong and effective, and was cited numerous times as one reason for the long-term success of this watershed organization.

The RCC leadership and participants strived mightily to attain inclusive and representative participation, but fell short due mostly to the voluntary nature of these
organizations. The lack of demographic diversity (minorities, low income) was mostly a function of the voluntary nature of this group. Even though women were overrepresented in the Rock River Basin Coalition, the typical group participant was a highly educated white male, belonged to a middle-upper level income group, and was attracted to voluntary work within an organization such as the RCC. In addition, many of the participants have an interest in watershed management because their occupation is related to water quality, land use activities, preservation efforts, or biology. Some private business interests and farmers were involved in watershed group activities, but were underrepresented compared to males working with government or state entities.

Success was also realized from the effective use of both scientific expertise and local knowledge at varying scales. In addition to projects at the watershed scale, issue teams and their monitoring efforts at this smaller scale contributed to the overall success of the larger basin group. The use of local knowledge in conjunction with scientific expertise from agencies working closely with the RCC Coalition, was another major success story for the Rock River. The RCC utilized what I call a nested hierarchy approach, which is a good strategy considering the need to work on issues at varying scales within the new paradigm of the watershed approach.

In this basin, bottom-up efforts met the top-down agencies in an effective way. Finally, education and outreach were utilized very effectively within the Rock River, and such efforts were coordinated well within the nested scale hierarchy just described. In other words, the selection of information exchange mechanisms was carefully planned and applied at the proper scale.

The threats that seemed to emerge from this focus group centered mostly on participation diversity, which I described above, as well as trust, consensus decision-making, and the proper
role of government to ensure compliance. Trust was a major problem due to the history of the basin. This historical lack of trust falls under the category of context. In this case, the historical context of mistrust towards the DNR, one of the major agency stakeholders leading the RCC, was a problem that loomed over some of its efforts to engage citizens in the watershed. Some people distrusted the DNR for perceived meddling and interference in the past, while others were dissatisfied with a lack of regulatory effort (authority) regarding abuses of waterways and other resources. There was a good deal of effort to overcome that lack of trust, however, and it appears that some success has been attained in building up trust in areas where little existed in the past.

The twin concerns mentioned here, lack of trust due to interference on the one hand and dissatisfaction with poor regulation on the other, leads to the tricky question of the proper role of government regarding regulation. Compliance is the cornerstone indicator of legitimacy in watersheds and the possible need for regulatory authority should not be overlooked. It is for this reason that I asked focus group participants about the best regulatory role for government. I left that question open-ended at the time, but in retrospect I could have asked a more specific question dealing with the prospects of gaining regulatory or taxing powers for the watershed group itself. The way I addressed greater group empowerment was via the more general question about increased regulation. Yet, no definitive answer emerged for this question. One participant summed it up best by saying, "It depends whose ox is being gored." Using the meager results from this one focus group I can only conclude that the role of government and governmental regulations to enforce compliance is a tricky one, and agencies often end up in the middle. The "worst of both worlds," or the best depending on how it is done, may be another appropriate phrase to use here. The future refinement of government's role in watershed collaborations is definitely worth investigating and pursuing.
Consensus was brought up as a discussion point by me because of the plethora of critiques that emerged from the literature regarding this form of decision-making; the dominant one for natural resource collaborations. Again, I cannot come to any definite conclusions regarding consensus except to say that all focus group participants felt it was the best model in this case. This belief in consensus could be a result of the participant’s personal experience and knowledge, but some of it may also be due to the promotion of consensus by many agencies over a long period of time. One participant did admit to a problem encountered in other collaborations: the desire to avoid contentious issues. This participant noted that RCC did not have the "authority" to take on contentious issues, which is related to the proper role of government and regulatory authority to achieve compliance. This does not bode well for making future improvements in the watershed considering the fact that efforts to improve water quality typically end up being quite contentious. This link between consensus and regulatory authority, which is also related to trust (or lack of trust) towards government, is worth pursuing in future research. The results here did help me refine survey questions in order to address these issues.

Finally, it should be noted again the Rock River Coalition is a very successful watershed organization. Despite this fact, the following threats to legitimacy emerged: lack of participatory diversity, trust issues, compliance problems, and questions about consensus. It is logical to assume that in other, less successful watershed organizations these problems would likely be present as well, and potentially more problematic. Also, other legitimacy problems that were not mentioned here are likely to exist in some of these other less successful groups. If a watershed partnership as long-standing and effective as the Rock River Coalition has legitimacy issues, it is reasonable that legitimacy problems could be far severe in many watersheds in the Midwest.
1. **Background to the Basin**

The SE Fox River drains over 1000 square miles in southeastern Wisconsin and contains over 700 miles of streams. There are roughly 500,000 residents living in the SE Fox basin in Wisconsin, which contains Kenosha, Racine, Waukesha, and Walworth Counties (Figure 15.11). The Fox River flows southward after leaving Wisconsin and traverses Northern Illinois before emptying into the Illinois River near Ottawa in La Salle County (Figure 5.21 in Section C of this chapter). The SE Fox Basin in Wisconsin is experiencing rapid population growth, which is not unexpected considering its position in a corridor between Chicago to the south and Milwaukee to the east. Some of the larger cities in the SE Fox are Brookfield, Pewaukee, Waukesha, Mukwonago, East Troy, Lake Geneva, Pleasant Prairie, parts of Kenosha, and Burlington (SE Fox Partnership website 2004). The first cities three listed are close enough to be considered bedroom communities for commuters of Milwaukee. The SE Fox is best characterized as a mix of urban and agricultural land use; with some protected nature preserves, state, and county parks. Groundwater quantity and quality issues are important in the SE Fox basin because all drinking water comes from groundwater sources (Wisconsin DNR 2002b). Despite the urbanization that is occurring within the watershed, natural resource and ecological preservation are important considerations within the SE Fox basin. Protection of wetlands is a major issue here. The SE Fox contains almost 78,000 acres of wetlands, making up about 11 percent of the basin. Like the Rock River, the SE Fox drains ultimately to the Mississippi River, but it lies adjacent to the divide that starts to the east and drains into Lake Michigan.
Figure 5.11 - Southeast Fox River Basin of Wisconsin (SE Fox River Partnership Website)
2. **Watersheds of the SE Fox: Water Quality and Hydrological Problems**

Surface Water quality within the SE Fox basin mostly varies according to the level of urbanization. The highest water quality exists in areas where there is less urban and agricultural land use, such as Bluff Creek and Genesee Creek areas. Most of the surface waterways in the SE Fox have water quality that is good enough to support a full range of fish and aquatic life. Nine stream miles out of a total of 700 miles are rated as having exceptional or outstanding water, meaning that discharges from municipal and industrial wastewater treatment plants are as good if not better than the quality of the existing streams. These high quality streams include Genesee Creek and Spring Lake on the Middle Fox River, Mukwonago River and Lulu Lake, and Potawatomi Creek and Van Slyke Creek in the White River/Nippersink Creek watersheds. Seven percent of streams in the basin consistently do not meet water quality standards and almost all of these are in the Upper Fox River and Sugar-Honey Creek watersheds. Roughly 56 miles of streams and two lakes are on the EPA’s 303(d) list of impaired waterways. The two lakes on the 303(d) list are Little Muskego Lake and Wind Lake which are located within the Middle Fox River watershed (Wisconsin DNR 2002).

Sources of point pollution in the SE Fox generally come from industrial discharges and municipal waste water treatment plants. Diffuse, or non-point source pollution, is carried with surface water runoff during rain events and is sometimes just described as runoff pollution. The water quality problems in the Southeast Fox are mostly due to changes in land use; especially urbanization of rural areas, and these are typically a cause of non-point source pollutants. Construction in rapidly urbanizing areas can increase erosion of sediment into waterways, and permanent conversion of rural to urban land uses increases the amount of impervious surfaces, which leads to increases in both flooding and sedimentation. Storm water pollution is another
Nutrients can be very problematic in agricultural areas, where heavy fertilizer use can result in phosphorous or nitrogen pollution into streams and lakes. Nitrogen is a common pollutant that runs off from agricultural landscapes, but phosphorous is used by both farmers and suburban land owners. In addition, phosphorous pollution in waterways can come from point sources because it is contained in both industrial and municipal wastewater discharges. Phosphorous is biologically limiting in freshwater so it can cause algae blooms, particularly in the daytime. At night, when respiration continues despite the lack of oxygen-producing photosynthesis, the demand for total dissolved oxygen is great and this leads to stresses on the aquatic ecosystem. These large diurnal swings in dissolved oxygen concentrations are detrimental to fish and other species that require a more stable oxygen supply. This process is actually worse in the summer because respiration and decomposition greatly increase due to higher levels of biological activity. In winter, this activity is reduced, yet some submerged phytoplankton still photosynthesize and thus easily meet the biological oxygen demand (BOD) of a lake or stream’s reduced biological activity. In addition, warmer waters encountered during the summer do not hold as much of any gas, including dissolved oxygen (Hudson River Environmental Conditions Observing Station - HRECOS - website 2011). One source of contaminated sediment in the SE Fox is PCB, which is no longer in use but still exists in certain areas such as the Fox River and Tichigan Lake in Racine County where fish advisories for this substance are in effect (Wisconsin DNR 2002).

Stream and shoreline modifications have destroyed bank vegetation and altered the normal hydrological flow of waterways. The destruction of these riparian strips impact water
quality because such vegetative buffers prevent water temperatures from fluctuating, and stabilize the bank from excessive erosion and sedimentation. Development in floodplains is common in the SE Fox watershed, and this leads to an increase in impervious surfaces and the reduction of water storage within the floodplain itself. Both of these create a more "flashy" hydrological situation during heavy rain events, and thus flooding can be a big problem as a result of these land use changes (Wisconsin DNR 2002).

Ditching and drainage of wetlands, commonly done by farmers to increase acreage in production and to hasten the flow of water through their property, also negatively impacts normal hydrological flows and leads to similar flooding and sedimentation problems. There are over 100 dams within the SE Fox basin. These dams cut off the stream from the floodplain, thus reducing the replenishment of nutrients back into the alluvial soils. This is not only bad for the long-term fertility of agricultural lands, but is detrimental to terrestrial ecosystems that exist along the stream bank margin. Dams retard the flow of water which harms species that thrive in a flowing environment. Also, dams slow or prevent the migration of fish and other aquatic organisms within the ecosystem. Dams often trap suspended sediment load in the stream and this alters the critical movement of organic rich sediment downstream within the stream ecosystem. In addition, the accumulation of sediment behind the dam can threaten the sand and gravel bed habitat of valuable invertebrates, which in turn hurts fish that feed upon these organisms. Finally, dams can alter the temperature regime of stream systems by allowing the water to warm and thus threatening cold water species such as trout (Wisconsin DNR 2002). Below is a brief description of the seven major sub-basins within the Southeast Fox Basin, and some of the common water resource issues encountered within these watersheds.
**Des Plaines River Watershed**

The Des Plaines River watershed is in the southeastern part of SE Fox basin in Wisconsin, but flows south into the Chicago metropolitan area. In Wisconsin it consists of 85 miles of perennial streams which drains about 133 square miles. Most of the Des Plaines River watershed lies in Kenosha County, with a small section in Racine County to the north. Part of Kenosha and Paddock Lake are in this watershed, as are the cities of Pleasant Prairie and Union Grove. Most of this watershed lies within agricultural land use (62%): with grasslands (11%), forests (10%), wetlands (8%), and urban areas (2%), making up the rest of the land cover. No streams in the Des Plaines River watershed in Wisconsin are on the 303(d) list of impaired waterways, but this region has its share of water quality threats. Among these are increased nutrient loads from agricultural activity, sedimentation from agricultural and urban development, drain impacts, and historic ditching. Lakes are threatened by heavy shoreline development, transient pressure, agricultural and urban runoff, and excess nutrients. Many of the pre-settlement wetlands were filled or tiled for agricultural purposes. Pirate perch is rare for Wisconsin, but is still found in this watershed. Major lakes in this watershed are Lake Shangrila-Benet (the largest at 154 acres), Montgomery, and Paddock (Wisconsin DNR 2002).

**Lower Fox River Watershed**

The Lower Fox River watershed lies to the west of the Des Plaines watershed and covers parts of Kenosha and Racine Counties, with a very small section in Walworth County to the west. The cities of Burlington, Silver Lake and Twin Lakes are located within this watershed.
Agriculture is the dominant land use in the Lower Fox (47%), but to a lesser extent than the Des Plaines Basin (67%). The Lower Fox has about the same percentage of urban land use (2%) and grasslands (11%) as the Des Plaines, but has a higher percentage of forests (15%) and wetlands (13%). The Fox River in this part of the basin is a large river that has several smaller streams draining directly into it. Among these are Hoosier Creek, Wind Lake Canal, and Eagle Creek (Wisconsin DNR 2002).

Like the Des Plaines watershed, none of its roughly 90 miles of streams are listed on the 303(d) list of impaired waterways. This sub-basin of the SE Fox experiences water quality threats similar to those found in the Des Plaines. Among these are urban and agricultural runoff which carries excess nutrients and sediment; and ditching, tiling and channelization, which causes bank erosion and flashy hydrological conditions. Additional water quality threats in the Lower Rock are impoundments, development, industrial discharges, gravel pits, and storm water runoff (Wisconsin DNR 2002).

The Fox River contains a modest amount of forage and game fish species for recreational purposes. The Wisconsin DNR states that the Lower Fox River has a “diverse and relatively abundant mussel population that should be thoroughly studied (Wisconsin DNR 2002).” There are obvious connections between the Lower Fox River in Wisconsin and the Fox River downstream in Illinois, and the same DNR report states, “Implementation of conservation practices and restoration in the sub-basins that feed that feed the Fox River would have positive impacts on the resources that eventually cross the border to our south (Wisconsin DNR, 2002).” Lakes in the watershed are threatened by heavy recreational use, shoreline development, and loss of habitat. In addition, two invasive species, Eurasian water milfoil and Zebra Mussels, are
threats to lake ecosystems. There are 13 named lakes in the Lower Fox watershed, with Silver Lake in southwestern Kenosha County the largest (Wisconsin DNR 2002).

Figure 5.12 - Southeast Fox River between Waterford and Burlington, WI

White River/Nippersink Creek Watershed

The White River/Nippersink Creek watershed lies in the southwestern corner of the SE Fox basin, primarily in Walworth County with small sections in Kenosha and Racine Counties. Parts of Burlington and Lake Geneva lie within this watershed; as do Fontana-on-Geneva Lake, Genoa City, Twin Lakes, and Williams Bay. Again, agriculture is the dominant land use with a
similar percentage as the Lower Fox (47 percent), and similar percentages with regards to forest (13%), wetlands (10%), and grasslands (10%).

Like the Lower Fox, the White River/Nippersink Creek watershed has a greater percentage of forest, wetlands, and grassland than does the Des Plaines watershed to the east. However, the White River/Nippersink Creek is different than the first two in that 4 percent (versus 2% for the other watersheds) of its land use is urban. The White River/Nippersink Creek watershed has over 120 miles of perennial streams, and like the Lower Fox and the Des Plaines, none of its streams are on EPA’s 303(d) list. The 128 miles of streams in this watershed drain about 168 square miles and again, no streams show up on the 303(d) impaired list. However, the same water quality threats apply here: urban and agricultural runoff with their associated nutrients and sediment, ditching, channelization, impoundments, and development.

Because Nippersink Creek is a good warm water source it contains large populations of game fish and thus has unique resources at risk from the threats listed above. In addition, there are mussel populations that are typically sensitive to various pollutants, including the ellipse which is listed by the state as a threatened species. Agricultural best practices are being advocated here to lessen impacts to these resources, including planting of buffer strips and restoring the channel to its natural meandering state. These best management practices are specifically designed to reduce sedimentation and nutrient runoff into waterways. There are 9 names lakes within this watershed and these suffer from invasive species (exotics), excess nutrients, boating impacts, storm water runoff, shoreline development, and pollution from septic systems. The largest of these lakes is Lake Geneva which is 5,262 acres in size and the smallest is Tombeau Lake which covers about 35 acres (Wisconsin DNR 2002).
Middle Fox River Watershed

The Middle Fox River has 191 miles of perennial streams that drain 248 square miles, making it the largest of the sub-basins within the SE Fox basin. It is located in the east central part of the basin, lying within parts of Racine and Waukesha Counties, along with a very small sliver of Walworth County to the west. Like the White River/Nippersink watershed to its southwest, it has about 4 percent of its land cover in urban areas. The breakdown for agriculture (41%), grasslands (18%), wetlands (14%), and forests (13%) are similar to those for White River/Nippersink. None of the streams in this watershed are listed on 303(d), but the Middle Fox River has some significant cold water streams draining into it; including Genesee Creek, Mill Brook, Brandy Brook, Pebble Creek, Pebble Brook, and Spring Creek (Wisconsin DNR 2002).
Brook and brown trout fisheries are unique to Genesee and Spring Creeks, but the others have cold water communities of Mottled Sculpin and American Brook Lampreys. Elevated temperature is a unique threat to this watershed; along with agricultural and urban runoff, sedimentation, storm water runoff, ditching, channelization, habitat modification, and construction site erosion (sedimentation). Recommend practices for this watershed include dam removal, habitat improvements, restoration (where possible), and buffer implementation. These practices are utilized to provide a number of benefits such as bank stabilization, enhanced water quality, reduced sedimentation, and a lowering of nutrient levels in the streams (Wisconsin DNR 2002).

Figure 5.14 – Southeast Fox River Bank Diversion – Stone Wall near Burlington, WI
There are 19 named lakes in the Middle Fox River watershed; and threats to these include historical ditching, agricultural runoff, storm water runoff, invasion by exotic species, and dams. Big Muskego Lake is the largest lake at 2,260 acres and is undergoing “biomanipulation” to improve water quality in the lake, as are several lakes further downstream. This biomanipulation project consisted of the removal of carp and bullheads and the establishment of desirable rooted and emergent aquatic plants. These plants take up and use much of the excess nutrient matter that would otherwise cause excessive algae growth, both within the lake and downstream. In addition to efforts to increase the growth of rooted vegetation, another goal centered on maintaining large numbers of predator fish. These practices increase water clarity as well as fostering a more balanced ecosystem, both of which enhance fishing and other recreational activities. It was noted that this type of lake management is complicated by the fact the Lake Muskego is a very shallow lake whose bottom is easily disturbed by wind and waves. This leads to decreased water clarity, increased nutrient availability, excessive algae growth, and unhealthy fluctuations in dissolved oxygen levels. All of these conditions favor the growth of carp which further damages the lake ecosystem due to their bottom-feeding habits (Wisconsin DNR, 2002).

Sugar and Honey Creek Watershed

To the south and west of the Middle Fox River watershed lie Sugar and Honey Creek watershed. Located mostly in Walworth County, with the remaining 10 percent existing in Racine County to the east, this watershed covers about 166 square miles and is drained by a total of about 118 miles of streams. Sugar and Honey Creek meet at the Honey Creek impoundment, and Honey Creek continues downstream a short distance before emptying into Echo Lake at the
downstream end of the watershed. Agriculture makes up about 58 percent of Sugar and Honey Creek, more than any other watershed in the SE Fox Basin except for the Des Plaines (62 percent). Forest covers 13 percent of the watershed, grasslands makes up 11 percent, and wetlands incorporate 11 percent of the Sugar and Honey Creek watershed. Urban lands cover only 1 percent of the watershed making this region the least urbanized part of the SE Fox basin. Two larger towns within the watershed are Elkhorn and East Troy.

Figure 5.15 – Southeast Fox River Hydrological Diversion – Dam near Burlington, WI
Unlike the other watersheds within the SE Fox, this watershed does contain a number of streams (19) that are on the 303(d) list for impaired waters. The only other watershed in the SE Fox that has a number of impaired streams is the Upper Fox watershed which has 25 miles of impaired streams and will be discussed later. Agriculture and urban development create runoff containing nonpoint sources of pollution here, mainly nutrients (P and N) and sediment. Other water quality threats are impoundments, construction site erosion, ditching, channelization, hydrologic modification, and stream bank erosion. Despite the high impacts associated with agricultural use, this part of the basin does contain a high degree of diversity with regards to forage and game fish species. Best management practices for agriculture have been called for in this watershed, including buffer strip plantings and habitat restoration. Both of these practices serve to reduce bank erosion and enhance fish species and water quality. There are eleven named lakes in this watershed with the largest being Green Lake (311 acres). Threats to lake water quality include agricultural runoff, invasion by exotic species, and historical ditching (Wisconsin DNR 2002).

**Mukwonago Watershed**

To the north of Sugar and Honey Creek watershed is the Mukwonago River watershed, which is located in a small, northwestern section of the SE Fox basin. This is the smallest watershed within the SE Fox, and contains 49 miles of perennial streams which drain only about 86 square miles. This watershed lies within Waukesha and Walworth Counties, but does have a tiny section that exists within Jefferson County to the west. The villages of Wales, Eagle, North Prairie, and Mukwonago are located within this watershed. Like the other watersheds in the SE
Fox basin, Mukwonago is mostly a rural watershed with 37 percent in agricultural land uses, 22 percent covered by grasslands, 22 percent in forests, and 9 percent in wetlands. Urban land use covers about 2 percent of the total watershed. This watershed contains the largest percentage of forested area at 22 percent, whereas all of the other watersheds in the SE Fox have 15 percent or less of their land cover in forests. Not only does the Mukwonago have no streams listed on the 303(d) list, but it contains 4.9 miles of streams and one lake that are classified as outstanding or exceptional for water quality.

Figure 5.16 - Southeast Fox River Riparian Vegetation – near Waterford, WI
The DNR Report (Wisconsin DNR 2002) describes the Mukwonago as the "least disturbed watershed within the Southeast Fox River Basin." Such high water quality has supported diverse and unique populations of forage fish, game fish, mussels, amphibians, and invertebrates; but unfortunately there has been a significant increase in development which is posing a threat to these same resources. Jericho Creek and a ditch in the town of Mukwonago both support a cold water aquatic community. Storm water runoff is becoming more of a problem as a greater percentage of the watershed is being transformed into impervious surfaces. There has been a substantial land cover switch from agricultural land cover to suburban uses in the past few years. Dredging, ditching, channelization, irrigation, and runoff from agricultural and urban sources are the main impacts to water quality in the Mukwonago watershed. This small watershed has 15 names lakes which are seeing threats from storm runoff, exotic species invasions, sediment, and nutrient runoff from both urban and agricultural activities. Due to the amount of undeveloped land and associated high water quality existing here, the SE Fox Partnership has given this watershed particular attention with regards to preservation of these natural resources (Wisconsin DNR 2002).

**Upper Fox River Watershed**

To the northeast of Mukwonago River watershed is the northernmost watershed within the SE Fox, the Upper Fox River. This watershed is located almost entirely in Waukesha County with the exception of a very tiny section in Washington County to the north. The Upper Fox drains about 151 square miles and contains 86 perennial streams. Some of the streams that drain into the Fox River are Brandy Brook, Deer Creek, Pebble Creek, Pewaukee River, Poplar Creek,
and Sussex Creek. Like the other watersheds in the SE Fox basin most of the land coverage is rural; but unlike the others, grassland is the biggest component of those rural lands (31 percent). Also, unlike the other watersheds urban land use is significantly larger, covering about 20 percent of the land area. Wetlands make up the other 12 percent while forest makes up 12 percent of this watershed. The high percentage of urban land use is due to the extension of the western suburbs of Milwaukee into this watershed.

![Image of fishing on the Southeast Fox River near Burlington, WI](image)

**Figure 5.17 – Fishing on the Southeast Fox River near Burlington, WI**

Some of the cities located in the Upper Fox watershed are Brookfield, Delafield, New Berlin, Pewaukee, and Waukesha. Water quality within the Upper Fox River varies quite a bit, and 25 miles of streams are on the EPA's 303(d) list of impaired waters; including the Fox River,
Park Creek and Zion Creek. Sussex Creek, for example, has been significantly impacted by mining and suburban development. Mining in this area is referred to as non-metallic mining, which is mining for sand, gravel, or limestone. Waukesha County, for example, has 16 active, permitted non-metallic mining operations, most of which are located in the western side of the county (www.waukeshacounty.gov). The conversion of rural lands to impervious urban surfaces contributes to flash flooding and other hydrological problems in this area. Impoundments cause hydrological impacts, as well, but they also degrade water quality and retard fish migration.

Figure 5.18 – Southeast Fox River Flowing Through Waterford, WI
Other stream water impacts in the Upper Fox watershed are urban and agricultural runoff, stream bank erosion, construction site erosion (and sedimentation), industrial and point source pollution, hydrological and habitat modifications, ditching, and channelization. On the other hand, Cocoa Creek which flows into Pewaukee Lake, has the potential to support a cold water aquatic community, and the Pewaukee River contains some forage and game fish species. Pewaukee Lake is the largest of three named lakes in the watershed and it encompasses 2,493 acres (Wisconsin DNR 2002b).

3. **Reasons for Choosing the SE Fox basin**

Like the Rock River, the SE Fox River Partnership is an outgrowth of the Basin Initiative former Director George Meyer mandated for the DNR in the late 1990's. The idea was to manage natural resources based on the more natural boundary of watersheds, in this case the large basins within the state of Wisconsin. Some of these basin groups exist mostly in name only but several are functioning entities, and the SE Fox and the Rock River are two prominent examples of successful basin efforts. Like the Rock River, the SE Fox Partnership has been very successful and has sustained its effort since the late 1990's.

4. **SE Fox Focus Group**

The Se Fox Focus Group consisted of six volunteers who were contacted from the SE Fox River Partnership list. Like the Rock River Focus Group, these participants were associated with the basin group in some capacity as volunteers, but some were also employed by agencies dealing with water resource issues. Because of the voluntary nature of my focus group
participants, generalizations applicable to the general public may be problematic. This research project, however, is relying on people who are knowledgeable about watershed activities in order to uncover legitimacy issues in the watersheds. The Focus Group members will not be named for privacy reasons, but I have listed the type of organizations associated with these individuals in order to provide some context about their backgrounds and experiences.

**Participant A** = DNR employee specializing in ecological concerns in the watershed

**Participant B** = DNR employee specializing in development issues in the watershed

**Participant C** = DNR employee dealing with watershed issues

**Participant D** = Local Landowner and Member of a Local Water Resource Management Agency

**Participant E** = Local Landowner

**Participant F** = Local Landowner and Conservation Farmer

5. **SE Fox Hypotheses: Themes and Indicators**

Below I listed the major hypotheses developed from qualitative data analysis of the SE Fox focus group. I am using the term "indicators" as described by Berelson in his 1952 book on content analysis to describe any quotes and statements that helped in the formulation of my hypotheses. The hypotheses which I list a bit further down are derived from the following list of themes, or categories, as they are sometimes called. Some of the same themes and hypotheses that were described for the Rock River apply here as well, partly due to the geographic closeness of the two basins, and partly due to their similar associations with UW-Extension and the Wisconsin Department of Natural Resources (DNR). The themes and hypotheses are described first, and the indicators supporting these are listed afterward. Below is a list of the major themes
uncovered from my qualitative data analysis, followed by a detailed description of each theme and associated hypotheses.

(1) Participation: The Voluntary Nature of Collaborations Affects Diversity
(2) Participation: Proximity to Water Affects Interest Level
(3) Conflict, Trust and Property Rights
(4) Compliance: Education, Stakeholder Type, the Role of Government and Fragmentation
(6) Capacity Building: Role of Science, Local Knowledge, Education, and Funding

**Participation: Voluntary Nature of Watershed Collaborations**

**Hypotheses 1: "Attaining Demographically Diverse Participation and Representation is Difficult due to the Voluntary Nature of the Watershed Groups"**

**Theme: The Voluntary Nature of Watershed Group Participation and Diversity**

The leaders and government officials involved in SE Fox watershed activities made a concerted and honest effort to get inclusive participation by citizens within their watershed, but like the Rock River this effort was largely unsuccessful. The participation in watershed activities was skewed like it was in the Rock, because the people who had the greatest interest in the goals of the group were often involved in water resource issues to begin with, usually professionally. For this reason, the SE Fox did not have a broadly diverse demographic mix within their group. Minorities, women, and people in lower socioeconomic strata were underrepresented when compared to the demographics of the entire watershed. This reflects what I will call "the voluntary effect," and explains why voluntary groups like watershed collaborations are
overrepresented by socioeconomic groups who tend to have a high level of interest in this particular topic. The SE Fox, like the Rock River to its west, suffered from this voluntary effect. Because of the voluntary nature of the watershed group, then, individuals with prior interest in water quality preservation of natural resources are vastly overrepresented in the collaboration. This works against inclusive participation because some demographic groups contain few individuals with this level of interest, and these groups are thus underrepresented in the watershed collaborative process.

This is entirely to be expected, of course, and seems like it would always be a drawback to any voluntary organization. Many of the participants the SE Fox group and its sub-watershed groups are professionals with varying government agencies or universities, or people with a similar professional bent towards watershed management issues. This leads to a great deal of scientific expertise and professional capacity building which is a good thing, which will be described later, but works against inclusive and diverse representation for all citizens within the watershed. Such a stilted group make-up may not necessarily take into account all of the interests and concerns of the citizens in the watershed. This issue will be discussed in more detail later.

Below are some of the comments that relate to the hypotheses that the SE Fox collaboration did try hard to get diverse participation, but fell short due to the voluntary nature of the group. I want to note the very first two indicators below, which discuss the great diversity of participation from an occupational or stakeholder perspective, but not from a demographic one. These are good signs that there is inclusiveness with respect to the different types of stakeholders in the basin, a laudable goal from a legitimacy perspective -- but these are unrelated to demographic diversity. For the most part, when I talk about diversity I am referring to socio-economic, racial or gender characteristics, also known as demographic data. Below are a few
indicators that helped support the formulation of this hypothesis. Additional indicators can be found in Appendix C.

**Indicators: Voluntary Participation and Diversity**

"I would say when I'm talking about when I hear you use the term watershed group, I'm talking about voluntary groups."

"I can think of one (storm water planning group) right now where you do have a good diverse group, including a non-profit group, environmental group, builders association, local industry, you've got citizens that are not associated with any groups that are involved in this process."

"Many declined to participate (despite repeated invitations)."

**Participation: Proximity to Waterways**

**Hypotheses 2: "Participation in the SE Fox is determined by Proximity to the Water Body"**

**Theme: Proximity to the Water and Level of Participatory Interest**

There were several other themes related to participation that emerged from the SE Fox focus group. One such theme regarded proximity to the water. Several times during the focus group discussion some participants related how they found participatory interest in their group (the larger SE Fox Partnership or nested smaller scale groups) to be a function of how close residents live to the water body under analysis. The level of interest appeared to be based on the
geographical location relative to the waterway, as well as two other factors that will be discussed later: conflicts over property rights and the level of trust towards government agencies involved in water resources. As mentioned above, the members of the SE Fox River Partnership were good at attempting to diversify participation within the group, but seemed to be stymied by a lack of interest on the part of many people. Several times it was mentioned that the level of interest seemed to be a function of the distance to the river or lake shoreline. People are simply going to be more aware and interested in watershed activities if they live close to the waterways within the drainage basin. Below are listed few indicators from the focus group supporting the formulation of this hypothesis. Other indicators have been placed into Appendix C.

**Indicators: Interest Level and Proximity to the Water**

"Your proximity to the water equals your level of interest - if you own property on the water you’re 100 percent into it."

“As you move further back (from the water), you get into some ag lands, and there is less interest there."

**Conflict, Trust, and Property Rights**

**Hypotheses 3: "Conflict in Watershed Collaboration is driven by the Salience of the Issue, Particularly Property Rights, as well as the Level of Trust of Government Agencies"**

**Theme: The Link between Conflict, Trust, and Property Rights**
The most contentious issues in the SE Fox seemed to be related to property rights. Many times the property right in question was use of shorelines and waterways by property owners. Other times, the property rights issue was related to economic development and its associated water quality impacts. Conflict seemed to be a driving factor for many deliberations within watershed groups, and the need to defend your position seemed to increase participation. This is similar to what Focht and Trachtenberg concluded in their chapter of *Swimming Upstream* (Sabatier et al 2005): that lack of trust causes greater participation. Stakeholders feel a need to defend their turf in these situations (Sabatier et al 2005). One focus group participant noted that meetings dealing with boating ordinances often had an overflowing crowd, whereas the typical meeting may only have about six people in attendance.

In the SE Fox, the two types of groups that seemed to buck the collaborative efforts of the partnership the most, and who exhibited high levels of distrust towards the DNR, were individuals or companies seeking to develop their properties and those living on the water. Many of those in the latter group were looking to get the DNR "off their backs" and allow them unfettered use of the waterways in question. This relates back to the discussion of how proximity to the waterway is a major factor affecting citizen interest, and thus participation within watershed group activities. Also, the more regulations that were involved (i.e. DNR regulations), the more distrust and conflict that seemed to develop. This is similar to what was seen in the Rock River, except here distrust was seen as even larger driving force for conflict. Not everyone who lived on the waterway, however, distrusted the DNR. Some watershed residents expressed dissatisfaction with the DNR for not being more aggressive in regulating damaging activities on lakes and rivers, but were generally trusting of that government agency.
This was also found in the Rock River Basin to the west. I will discuss this situation with regards to the SE Fox basin more in the section on the role of government and regulations.

**Indicators: Conflict and Property Rights**

Listed below are some indicators related to the hypothesis that contentious issues, such as those related to property rights, are often the types of issues that determine the course of action for watershed groups. The tendency to avoid contentious issues for the sake of consensus was mentioned by one participant in the Rock River focus group, but was not brought up here. However, my one hour and 30 minute focus groups were extremely limited regarding the amount of topics that could be covered, and there certainly exists the possibility that some issues may be avoided due to the desire to gain consensus. This issue of consensus affecting issues to be addressed was dealt with in the survey, and the results for those questions will be discussed in the quantitative section of this report. For the focus group done here, then, the topic did not come up, but that may have been due to the short time frame of the focus group meeting. However, whether a successful outcome resulted from this is unsure. Other indicators are shown in Appendix C.

"So you are bound to have some sort of conflict (due to DNR regulations on water use)."

"You kind of have a dichotomy---but we have all these regulations which are going to restrict it (water use)."
"We get a half a dozen people attending our meetings (usually). We had a boating ordinance meeting. It was standing room only, yelling ------."

Compliance: Education, Stakeholder Influence, the Role of Government Regulations, and Fragmentation of Authority

Hypotheses 4: "There is Record of Successful Voluntary Compliance in the SE Fox Basin, especially when Education and Outreach are involved, but Certain Stakeholders and Individuals do not comply, mostly due to a Lack of Trust. The Role of Government Regulations in order to attain Compliance is unclear due to Distrust from Certain Stakeholder Groups, and because of the Fragmentation of Zoning Laws"

Themes: Voluntary Compliance, Stakeholder Influence, the Role of Government, and Fragmentation

Compliance is a key element related to the legitimacy of watershed collaborations and is linked to trust and conflict: topics discussed above. But what is the best way to achieve compliance? What role should government play with regards to watershed collaborations, and how should government's role be weighted versus voluntary compliance? In both the Rock River and the SE Fox, I have described some of the negative and positive attitudes displayed towards government agencies, particularly the DNR. It is clear that governmental agencies in the Southeast Fox Basin play an important positive role as far as capacity building and scientific expertise is concerned, but what role should they take on when trying to illicit cooperation from the various stakeholders? Compliance with plans or recommendations (best practices) is a key
element of watershed collaboration; but the role of the various governmental stakeholders can often be muddied with regards to regulation, and that seemed to be the case here in the SE Fox.

In both the Rock and the Southeast Fox, much discussion centered on the need for voluntary compliance, but this is threatened by a lack of trust towards government on the part of some stakeholders. Voluntary compliance is indeed one key element required for the success of watershed collaborations, and the SE Fox Partnership was effective in getting some voluntary compliance. The level of voluntary compliance, however, depended often on the type of stakeholder involved and it relied heavily on education and outreach efforts. Many times people did not know that their activities were noncompliant with the law or best management practices, but when shown the error of their ways they would usually change the behavior that contributed to the problem. On the other hand, some individuals and stakeholder groups, most noticeably developers, were very reluctant to comply with recommended practices. Such lack of cooperation is tied to the low level of trust and animosity that these groups and individuals display towards governmental agencies. These stakeholders would often complain about that government interferes with their property rights.

Not everybody felt the DNR and other agencies were too intrusive, however, as was mentioned above in the section on trust. There were complaints that the DNR was not doing enough to reign in bad behavior in the watershed. This put some of these agencies in the middle regarding their role in attaining compliance, and muddied the issue of whether more or less regulation is needed. The communication from the SE Fox focus group leads me to conclude that the role of government regarding regulations is still very unclear and in a state of flux. There is no clear consensus on what government's role should be in achieving compliance within the watershed. In addition, there are so many different state, county, and municipal governments
involved in watershed efforts in the SE Fox, that their authority seems to overlap or become fragmented due to jurisdictional issues. One of the comments listed below sums it up best, "I've seen one parcel of land on a lake zoned one way by the county and another by the town."

So, the government's role or non-role in achieving compliance is complicated. Due to the close interrelationships between land use activities and water resource protection, zoning becomes very important. Yet fragmentation due to varying land use zoning laws makes compliance in watershed organizations very problematic. An added problem is that varying levels of trust and resentment towards governmental agencies exist, often determined by the type of stakeholder. This makes defining the proper role for government even more difficult, and threatens the idea of consensus-based decision making. Despite concerted efforts by individuals within the various governmental agencies to engender voluntary compliance, and despite the cooperation of stakeholders within the watershed, it is still apparent that a more centralized and organized method for controlling land-use activities within the entire basin will be needed soon.

**Indicators: Role of Government, Stakeholder Type, Compliance, and Fragmented Jurisdictions**

Below I have listed some of the indicators which relate to the hypothesis above. The key themes related to this compliance hypothesis are the success of voluntary compliance, the role of government and regulations, and jurisdictional fragmentation problems related to land use zoning. Below are few key indicators related to this hypothesis. More indicators can be found in Appendix C.
"A lot of it on the individual's part (of not complying) is a lack of education."

"The DNR has established a set of regulations and laws they go by, and they enact those. So, many people view them (DNR) as obstructionists, not enablers."

"They (developers) see these rules as a blockade and many times don't agree with the consensus."

"Some people don't agree with any regulation."

"The groups that I get involved in----maybe---I'm not talking about a lake shore property owners association. But, by and large, the main comment I hear from them is 'you mean guys (DNR) don't have the authority' to stop this, or 'how could you have allowed this to happen. You explain to them you don't have the authority. Most ----- the average person---- is really amazed at how little authority the department (DNR) has in almost every issue."

**Capacity Building: Role of Science, Local Knowledge, Education and Funding**

**Hypotheses 5:** "Capacity Building has been a Major Factor in the Success of this Partnership. Top-Down Scientific Expertise has met Bottom-Up Local Knowledge. Education Efforts at the Proper Scale have also facilitated this Goal. Funding from Government Agencies has also contributed greatly to Successful, Capacity-Building Efforts"
Related to the role of government is capacity building, which as described earlier, is one of the main positive impacts that governmental and educational institutions have on watershed activities in the Southeast Fox Basin. The two primary agencies involved here are the DNR and the University of Wisconsin-Extension; but other state and county agencies play a part, as do some municipalities, particularly when it comes to treatment of wastewater and zoning for development. These agencies are critical in supplying the type of expertise that has allowed this basin partnership to thrive as it has over the last decade, whereas many other basin groups established by DNR in the late 1990's have not fared so well. It is obvious from the indicators listed below that scientific expertise has served this partnership well. Another good thing about the effort of experts is that they have had a positive contribution to the success of the smaller scale watersheds nested within the SE Fox Partnership. This was seen in the Rock River, as well, and appears to be one of the greatest strengths for these two basin groups. The ability to have top-down expertise meet bottom up local knowledge has been a great asset in both basins.

Like the Rock River, education and outreach is a key component of this top-down expertise, and the SE Fox Partnership has been very effective in matching information exchange mechanisms to the proper scale of effort. Education was described as a key component of watershed awareness, and it has aided in garnishing greater compliance. Local knowledge was not discussed in this focus group as much as it was in the Rock River; but it seemed that respect for local stakeholders and their knowledge was high, and that particularly at the smaller scales the partnership relied on citizen monitoring for improving water quality.
Capacity building efforts involving scientific expertise and use of local knowledge are linked to other legitimacy elements such as education, outreach, and scale. Education and outreach are greatly enhanced through the capacity building efforts of agency personnel and knowledgeable local citizens, as well as funding from government or umbrella organizations. Scale is important because a watershed group needs to use scientific expertise, funding resources, local land experts, and educational mechanisms in varying degrees based on the size of the watershed, and at the appropriate scale. This is because different issues will become more or less important in different sized watersheds, and the capacity building mechanisms needed to address these salient issues will vary as well. The Southeast Fox Partnership does this very well, and for that reason they use what I call a "nested scale" approach to dealing with water resource issues within such a large basin.

Indicators: Capacity Building - Scientific Expertise, Local Knowledge and Education

Targeted at the Appropriate Scale Based on the Issue

As mentioned earlier, the bottom-up expertise of locals at the watershed scale meets the top-down scientific and economic expertise of educational and governmental institutions. In this watershed, the efforts of both are coordinated well and assigned to the proper scale of effort. A few key indicators from the focus group that are related to these interconnecting themes are listed below. Some other indicators are shown in Appendix C. A schematic model in Figure 5.19 below illustrates the relationship between various elements of capacity building and its overall impact on legitimacy.
"A lot of it is education, getting the word out to the public in general."

"Our education (about aquatic plants) is working."

"We (Root-Pike Watershed Initiative Network) get a lot of different people, conservation groups --- Dr. Kinzelman from the Racine Health Department who is doing a baseline study --- grad students from Parkside (University of Wisconsin-Parkside) ---- we have different task groups."
"It (scale of effort) depends again on your topic. ----- We're (DNR) looking at an information exchange program, and we're trying to see if we can do it as a regional basis."

"The smaller programs (watershed scale programs) even down to the individual lake level, are able to reach out and do one person talking to another, or one person talking to 20, 30 doing something like inviting classrooms to come out-----But an individual lake group or sometimes even the watershed group may not have the resources to do a mass media campaign to talk about watershed, water quality issues. So it depends on what your topic is."

"If your goal is to get people out to the water and talk about what's going in the waterway right now, a smaller group may be good if you're doing stream monitoring or newsletters targeting a certain group. But, if you're at trying to do, even like us, for legislation or information about runoff in general----to a construction audience -------you want a larger group."
Capacity Building: The Role of Funding on Capacity-Building Efforts such as Education, Outreach, and the Effective Use of Science

Hypotheses 5: "Funding from Government Agencies is a Significant Factor Contributing to Successful, Capacity-Building Efforts"

Themes: Funding and Capacity Building

Finally, it should be noted that funding, which often originates from the same agencies supplying scientific expertise, is also a key element of capacity building. In the Southeast Fox Basin, as was the case for the Rock River, funding is key factor in the "sustainability" of the watershed collaboration; a term I use to define the long-term staying power of the watershed group. At the end of both focus groups in Wisconsin, I opened up the meeting to open-ended comments about any topics that I had not covered while leading the group. In both cases, one or more participants brought up the issue of funding, stating that it was critical for the long-term survivability of the group. Funding was also stressed in the third and final focus group I conducted in the suburban Chicago area: the Poplar Creek Watershed.

Indicators: The Relationship between Capacity Building and Funding

It is one thing to have an enthusiastic set of volunteers who are knowledgeable about water resource issues and problems, but is another thing entirely to have a source of funding that allows the implementation of projects and best management practices on the ground; as well as facilitating the educational and outreach programs that are so critical for attaining compliance.
Below are a few indicators illustrating the important role of funding. A few other indicators are shown in Appendix C.

"So these groups are powerful tools, but I don't think in most cases people realize how much unified power is being able to implement a program and get money to do so."

"The DNR has a grant program. We issue planning grants. It's a competitive issue."

"Funding is an issue."

"You have to support your own watershed group through your own funding that allows you to tax and what have you, but you have to have liability (I think he means accountability to the Lake District). The DNR has some excellent grant programs but they keep getting pinched year after year. "

6. Conclusions

The SE Fox Partnership has been successful in several areas regarding the legitimacy of watershed collaboration. One key element of legitimacy is information exchange. Capacity building is important for information exchange in watershed collaborations, and is a function of both local knowledge and scientific expertise, as seen in Figure 5.19.

Where local knowledge at smaller scales meets scientific expertise from larger scale basin level groups, the nested scale approach is developed. Combined with outreach, education, monitoring, and education, the nested scale approach is a key ingredient of capacity building,
and enhances overall legitimacy. Education is an important component of information exchange and is one of the major elements of success within the SE Fox River.

Figure 5.19 – Relationships between Elements of Legitimacy

The role of education and outreach was mentioned numerous times with regards to both voluntary compliance and capacity building. Information exchange mechanisms that educate the
public and stakeholders within the watershed are keys for achieving the legitimacy goals of any collaborative group. The SE Fox Partnership utilized education very effectively, as was mentioned time and time again by the focus group participants, and this invariably led to enhanced legitimacy of the group's efforts. Education and outreach were very important for letting people know if their behaviors were detrimental to the resource base within the watershed, and for most people this new-found knowledge is all it took to change their ways. Information exchange mechanisms were tailored to the scale of the education and outreach efforts, and this led to an effective "nested scale approach" to garnishing voluntary compliance towards collaborative projects and goals.

Not everybody was amenable to behavioral change as a result of education and outreach, however. Certain stakeholders, such as developers and individuals distrustful of government were resistant to such efforts. This effect that stakeholder type had on voluntary compliance was one of the major legitimacy drawbacks to the collaborative effort in the SE Fox Basin. Like most natural resource collaborations voluntary compliance is critical for success, and the fact that certain stakeholders were distrustful of partnership efforts or were unwilling to engage in the same activities or follow the same rules, greatly hindered the potential for success.

A lack of diverse participation is another legitimacy issue within the SE Fox. Despite the best efforts of partnership personnel the demographic make-up of group participants is fairly homogenous; with educated, white males being over-represented. Conversely, low income groups, females, and minorities are underrepresented. Due to the voluntary nature of these watershed groups, individuals with a professional or personal interest in water quality and resource protection make up the majority of participants. This is good for capacity building through scientific expertise, but bad from a diversity perspective representing all of the residents
of the watershed impacted by water quality issues. Participation is therefore greatly affected by the interest level of the various groups within the watershed.

For general citizens, the interest level regarding water use issues and ability are also driving forces towards participation. The main factor affecting general citizens, however, is based on their proximity to the shoreline of the lake or stream. Those citizens living on or near the water were more likely to participate in partnership activities, even if it was just to attend a meeting over one or two issues. Related to the proximity of water is conflict, because many conflicts revolve around what activities are allowed in and on the water. More specifically, the salience of issues related to on-the-water use is what drove conflict. Conflict drove a lot of participation, in that people who were distrustful of government or the watershed collaboration itself felt the need to protect their turf by getting involved in meetings and other activities. The meetings dealing with restrictions on the use of waterways were the ones where conflict was high, and thus participation was also very high.

So, participation was significantly affected by stakeholder type, the level of conflict, and proximity to the water. All three of these factors are interrelated to each other, as well. This relationship can be seen Figure 5.20 below. Certain stakeholders are more likely to distrust government which leads to more conflict. Proximity to the water also leads to more conflict since use of waterways is a primary issue for watershed partnerships. This is related to property rights, of course, in that restrictions of property owners living on or near waterways will invariably be perceived as an invasion of property rights. The level of trust also affects participation, as Figure 5.20 illustrates. Trust will vary by stakeholder type, and less trust means more conflict, both of which will often increase participation. These are the citizens in the
watershed who will be most likely to participate in order to protect their turf in this conflict over
the use of water bodies. These relationships can be seen in Figure 5.20 below.

![Diagram](image)

**Figure 5.20 - Factors Affecting (and affected by) Participation in the Watershed**

The role of government is big in the SE Fox basin. Funding, leadership, and capacity
building all depend on governmental agencies at various levels within the SE Fox watershed.
This basin benefited from copious and effective use of all three, but its role with regard to
regulation is still in a state of flux, as well as being a source of dissatisfaction on the part of some
watershed residents. Some of these residents resented government for interference in their property rights, while others saw the government as shirking its duty to guard the commons and protect natural resources.

The legitimacy of future success in the SE Fox Basin may depend on reducing historically high levels of distrust towards participating governmental agencies, inducing greater participation by people living further away from water bodies, and getting a more demographically diverse population of citizens involved in watershed activities. These should assist in achieving more voluntary compliance of best management practices within the basin. However, the role of government needs to more clearly defined in cases when voluntary compliance via education and outreach are not enough, and regulation and coercion become necessary. If fragmentation of governmental authority with regards to critical land use activities remain as they are, the achievement of non-voluntary compliance will remain an elusive goal.

(C) Poplar Creek Watershed

1. Background to the Basin

The Poplar Creek watershed and its group are different from the other two basins in several key areas. First, this is a small watershed rather than a large basin, and covers only about 44 square miles (28,500 acres). Second, the Poplar Creek watershed is located in the Chicago metropolitan area and is entirely urban. Third, this watershed coalition started as a citizen-based organization, and only added agency personnel years after its inception (Poplar Creek Watershed Action Plan). Finally, the water quality here is much worse than that found in the vast majority
of waterways within the SE Fox or Rock River Basins in Wisconsin. Due to these severe water quality problems, Poplar Creek has been determined to be an impaired stream by the Illinois EPA and is on the 303(d) list for impaired waterways (CMAP 2007 - Poplar Creek Watershed Action Plan). The Poplar Creek is a tributary of the Fox River in Illinois and is considered part of the Upper Fox River Basin (Figure 5.21).

It is located almost entirely within Cook County, the most densely populated county in Illinois; with a small sliver located in Kane County. Parts of eleven different suburban communities are contained within the Poplar Creek Watershed, including the largest ones listed here: Elgin, Hoffman Estates, Schaumburg, South Barrington, and Streamwood. In addition, the Forest Preserve District of Cook County makes up a significant portion of the watershed (Figure 5.23 and Figure 5.28). Poplar Creek is listed as impaired because it does not support its designated uses of swimming and aquatic life. The causes and sources of water quality degradation within the Poplar Creek Watershed are described below, and were laid out in great detail by the Poplar Creek Watershed Coalition (PCWC) in a 2007 action plan. This plan was a part of a grant received from the Illinois Environmental Protection Agency (IEPA) for dealing with non-point source water pollution under Section 319 of the Clean Water Act. The Chicago Metropolitan Agency for Planning (CMAP) assisted in the writing of this report titled, "Poplar Creek Watershed Action Plan (CMAP 2007)."
Figure 5.21 – Fox River Flowing from Wisconsin into Illinois – Poplar Creek is a Tributary that flows into the Fox River near Elgin, IL (Wikipedia 2009)
Figure 5.22 - Location of Poplar Creek Watershed (Permission to Reproduce from CMAP)
Figure 5.23 - Municipalities and the Forest Preserve of Cook County within the Poplar Creek Watershed (Permission to Reproduce from CMAP)
2. History of the Poplar Creek Watershed Coalition

The Poplar Creek Coalition started out as an advocacy group of concerned citizens whose goal was to improve water quality and natural resources within the Poplar Creek Watershed, often by advocating for best management practices and other measures on the part of developers and local governments overseeing such development. Over time, a decision was made to ally with local and state governmental agencies in order to strengthen the group’s leverage for achieving its goals, and to further enhance the scope of its collaborative efforts. In this way, the Poplar Creek Watershed Coalition (PCWC) evolved from what Moore and Koontz (2002) called a "citizen-based" group to a "hybrid" organization. In this way, the PCWC is distinct from the SE Fox Partnership and the Rock River Coalition, both of which developed top-on-down within the Wisconsin DNR, and would be called "agency" based organizations by Moore and Kuntz (2002).

Today, the Poplar Creek Watershed Coalition (PCWC) consists of local planners, local governmental representatives, members of the Forest District and Forest Preserve, state resource agency personnel, and general citizens of the watershed. The PCWC works closely with two umbrella organizations; the Chicago Metropolitan Planning Agency (CMAP) and the Fox River Ecosystem Partnership (FREP). FREP is an organization that operates within the larger Fox basin that contains the Poplar Creek Watershed. Both FREP, and particularly CMAP, have provided scientific and bureaucratic expertise for the PCWP and its municipal partners.

The PCWC has developed two general types of goals: resource-based goals and watershed-coordination goals. Resource-based goals are focused on the preservation and improvement of physical and biological characteristics of the watershed. The sub-goals listed by
PCWC in their 2007 action plan include protecting and restoring aquatic and terrestrial habitat, protecting surface and groundwater resources, reducing damages caused by floods, and improving the access and availability of recreational resources (CMAP 2007). Watershed-coordination goals are similar to what some have called building "social capital" (Putnam 1995), and these include improving networks and trust among different stakeholders. The Poplar Creek Watershed Coalition lists several sub-goals for watershed-coordination: increased communication and coordination among decision-makers and stakeholders, municipal ordinances that are supportive of watershed plans and objectives, development of outreach and education to support watershed goals and objectives, and a mechanism for maintaining the presence and effectiveness of the PCWC (CMAP 2007).

3. Water Quality Problems of Poplar Creek

The Illinois EPA (IEPA) identified seven potential causes of water quality degradation within the Poplar Creek Watershed: fecal coliform (FC), sedimentation/siltation, chloride (Cl), low dissolved oxygen (DO), total dissolved solids (TDS), total suspended solids (TSS), and silver (Ag). Potential sources of these pollutants as identified by IEPA are highway and bridge runoff (not construction sites), urban runoff and storm sewer discharge, and unknown sources of fecal coliform (CMAP 2007).

The Poplar Creek Watershed Action Plan (CMAP 2007) stressed that their main goal was to address the sources of water quality degradation rather than simply treat its symptoms. The focus here was on urbanization, particularly systems used by municipalities to manage urban stormwater and the eventual impact on water quality and hydrology. "Hydromodification" was
listed as an outgrowth of urbanization and one that presents a unique problem to planners in the watershed. Also given special mention in this report were pollutants from highways, roads and bridge, especially salts applied during winter, and the need for municipalities and the state transportation department to deal with these threats in a new and comprehensive manner. Below is a brief description of the major water quality impairments to the Poplar Creek Watershed and the methodologies used to measure them.

Figure 5.24 – Poplar Creek of Northeastern Illinois – Schaumburg, IL
4. Methodology of Water Quality Assessments in Poplar Creek

Water quality within the Poplar Creek watershed was determined using two methods. One source was a comprehensive database of water quality for the Fox River Basin, the larger watershed containing Poplar Creek. This database was compiled jointly by the Fox River Study Group and the Illinois State Water Survey, and within the Poplar Creek part of the basin there were five water quality measurement stations. A count was done for the number of times that a sample exceeded Illinois water quality standards. If a given pollutant exceeded the IEPA standard for aquatic life support once, it was listed as a potential cause of impairment. Average concentrations and loads were computed using a time and flow weighting procedure. The flow data and concentration data came from different stations, which introduced some error into the procedure. However, the fact that the stations were separated by only a short distance (a little over one mile) limited some of the error inherent in this methodology (CMAP 2007).

Because the water chemistry stations were all located near the mouth of Poplar Creek it was impossible to link violations of water quality standards to specific practices or areas in upstream sub-watersheds. For this reason, the watershed suffered from a classic problem in environmental science: scientific uncertainty. In this case, the uncertainty was a result of the small number of water quality stations, but more significant was the clustered nature of those locations (most near the mouth). Also complicating the scientific analysis was the relative infrequency of sample collections and its impact on the accuracy of pollutant load estimations. This was a big problem for non-point source pollutants, whose loads are highly variable depending on hydrological variations such as snowmelt and storm events. It was noted that 80 or 90 percent of a particular pollutant's annual load could be delivered during high magnitude
events that occur only about 10 percent of the time. Using the sampling methods and locations available to Poplar Creek it was easy to miss these rare high-flow events, which could greatly reduce the accuracy of the results. The Poplar Creek Watershed Coalition recommended more sampling stations for future studies in order to determine "hot spots" of pollution sources within the watershed, something the present day database was unable to provide (CMAP 2007).

Figure 5.25 – Poplar Creek Watershed – Native Prairie in Poplar Creek Forest Preserve in Hoffman Estates, IL

In order to attempt to address the inability of the water sampling stations to identify hot spots of pollution, another method was also utilized. The other method to determine water quality in the Poplar Creek watershed was the use of a model (known as the Simple Model) that studied the relationship between yearly pollutant loads and land use categories. The version of
the model used here was developed by the Northeastern Illinois Planning Commission (NIPC), an agency that later evolved into CMAP, and was targeted for use by the Lake County Stormwater Management District. The load estimates were calculated by multiplying the acreage in each sub-watershed (there were 11 sub-watersheds in Poplar Creek) by a pollutant export coefficient for that particular land use.

Even though they have been identified as causes of water quality impairment in the Poplar Creek watershed, no load estimates were calculated for silver or chloride because the Simple Model does not include export coefficients for these pollutants. Land use data from the Northeastern Illinois Planning Commission (2001) was used for the analysis. In the analysis using this model, six different sub-watersheds were identified as causing higher pollutant loads per unit area than the other seven. This allowed the coalition to concentrate their plans on those so-called hotspot sub-watersheds. The model did not figure in water treatment practices already in place, and thus the actual pollutant loads delivered may actually be lower than calculated. However, it was assumed that the relative contribution of each sub-watershed would be the same because any differences in the age and efficiency of water treatment practices would tend to even out at the watershed scale (CMAP 2007).

**Fecal Coliform**

The flow weighted geometric mean for fecal coliform is often exceeded and has not been reduced over a period of years. It was concluded that a 30 percent reduction in fecal coliform is needed in order to meet the standard, which is a flow weighted geometric mean concentration of 200 bacteria per 100 ml. It is difficult to identify individual sources of fecal coliform, illustrating
another example of scientific uncertainty in this watershed. There are no wastewater treatment discharges into Poplar Creek, and overflows from combined sewage systems cannot account for the levels of fecal coliform detected here. Septic systems are prevalent in some areas of the watershed and were suspected as a source for some of the fecal coliform levels, but there is no data on locations or rates of failure for such systems. Other potential sources of fecal coliform are horse farms, pet waste, goose droppings and unpermitted landfills. Of these, horse farms was determined to be the least likely culprit based on their small numbers, but again, no data exist on any of these possible sources.

Figure 5.26 – Poplar Creek Watershed – Mixed Suburban and Recreational Land Use along Barrington Road in Schaumburg, IL – Alexian Brothers Hospital in the Background and Poplar Creek Forest Preserve in the Foreground
**Dissolved Oxygen**

A lack of data for this possible water quality impairment is again a major hurdle for scientists studying Poplar Creek, and despite being listed as a possible problem, no definite conclusions regarding low oxygen levels can be made. Dissolved oxygen fell below the standard of 5/mg per liter only once between 2001 and 2005, and the spread of values supports the contention that dissolved oxygen levels are above this absolute standard (5mg) during most of the year. However, Illinois law states that dissolved oxygen (DO) cannot drop below 6 mg per liter for 16 of 24 hours during the day, to account for daily fluctuations. Several data points show DO dropping below 6 mg/L, commonly during the day when respiration rates are higher. The report concluded that: “These observations suggest that continuous dissolved oxygen monitoring would likely reveal reason for concern, showing summertime dissolved oxygen frequently at levels that stress aquatic life (CMAP 2007).”

**Total Suspended Solids**

No numerical water-quality standard exists for total suspended solids (TSS) in Illinois but a general guideline has been established at 80 mg per liter. The flow weighted mean for 2001 to 2005 was only 39 mg per liter, and concentrations only seemed to exceed the guideline during high flows. Despite the effectiveness of storm water controls in the watershed such as dry ponds and wet un-vegetated ponds, higher flows can release some collected sediment which causes increases in TSS levels. Remobilization of sediment collected in streams during historical land
use changes ("legacy sediment") was also mentioned as a source for high TSS during high flow events (CMAP 2007).

**Total Dissolved Solids**

The weighted mean concentration of total dissolved solids (TDS) is below the standard of 1000 mg per liter, but some spikes do occur once in a while. It was concluded that TDS exhibit a seasonal trend, with higher levels occurring in the winter. Salt application to roadways in the winter was naturally suspected as the cause of this seasonal trend. The same seasonal trend was noted for chloride which is correlated to TSS, and is also associated with wintertime salt application (CMAP 2007).

**Chloride**

The Illinois standard for chloride is 500 mg per liter and Poplar Creek's flow weighted mean concentration was well below that value at 232 mg per liter. Spikes do occur in the winter, however, just as is the case for TSS. Again, salt application is the suspected cause. There is a strong positive relationship between chloride and stream flow which points to non-point sources as the main culprits. The relationship between flow and Chloride is stronger in the winter leading to a focus on road salts as a major source of this problem (CMAP 2007).
Silver

Silver has surpassed the Illinois standard of .0005 mg per liter on occasion, but flow weighted averages are very low. It was noted that silver does spike periodically, however. For this reason, it was decided that measured ambient concentrations needed to be reduced by 17 percent. No definite source of silver contamination was uncovered. A photography lab was suspected as the source, although electroplating or other industrial operations remain as other possibilities. It was hoped that municipalities would discover illegal sources, or that educational efforts would result in voluntary reductions in silver discharges (CMAP 2007).

Sedimentation

Although there is no Illinois numeric standard for sedimentation, a 2002 NIPC stream inventory pointed to areas where this pollutant may be particularly ubiquitous, and sedimentation was listed on the 303(d) list in 2006 as a potential cause of water quality impairment. Natural factors were suspected for the cause of high sediment levels in the middle stretches of Poplar Creek where it flows through the Poplar Creek Forest Preserve. The gradient is low here and deposition would be expected in this low velocity regime. However, bank erosion upstream could be caused by post-development flows. Retrofitting of upstream retention as a way to reduce erosion, along with riparian buffer strips and stream bank stabilization are being promoted as ways to decrease sedimentation (CMAP 2007).
Oil and Grease

There is no standard for oil and grease in Illinois for general use water bodies such as Poplar Creek. The nearby Des Plaines River, however, has a standard of 15 mg per liter in order to meet fishable (indigenous life support) and swimmable (secondary contact) standards for that waterway. The Fox River is used for a public drinking supply for over 200,000 people in Elgin, Sleepy Hollow, Bartlett, and Aurora, and therefore must meet a much stricter standard of .10 mg per liter. Because Poplar Creek flows into the Fox River upstream of these communities, oil and grease are considered potential causes of impairment. For the years 1993 through 1998 flow weighted mean for oil and grease was 8 mg per liters, putting it below the standard for secondary contact and indigenous life support (fishable and swimmable), but over the limit for public drinking supplies. Suspected sources of oil and grease are non-point runoff from commercial, industrial, and transportation uses. However, a weak and negative relationship with stream flow and oil and grease points to illegal point sources as the main culprits, rather than polluted runoff. There are few permitted point sources in the watershed and the ones catalogued by the U.S. EPA are downstream of the last monitoring station, so their discharges are not figured into the calculations for mean concentrations of these pollutants. This furthers the suspicion that illicit point sources are in play here. However, the dataset is sparse and unreliable, and a high probability exists that much of the oil and grease pollutant loading is coming from nonpoint sources (CMAP 2007).
Hydromodification

Like many urban streams, Poplar Creek's flow regime has been greatly impacted by land use changes and urban development. The term used to describe the resulting impact on stream flow is called hydromodification. The Illinois Environmental Protection Agency (IEPA) identifies several types of hydromodification as sources of water quality impairment. Dams are one type of hydromodification mentioned by the IEPA, but Poplar Creek does not have any dams on its main stem. However, several weirs and reservoirs exist on some of its tributaries. A second type of hydromodification mentioned by IEPA is the change that results from channelization and channel modification. Many reaches of the Poplar Creek and tributaries have experienced channelization over the years. Although IEPA did not site hydromodification as a source of water quality impairment for the Poplar Creek Watershed, there has been some severe erosion in some stretches of the stream and its tributaries. Excessive sediment picked up during the erosion process can lead to reductions in water quality (CMAP 2007).

The flow regime itself is not explicitly mentioned by the IEPA as a type of hydromodification, but it is probably the biggest hydrological impact resulting from land use changes, particularly urbanization. Urbanized runoff dramatically increased the stream flow of Poplar Creek from the 1950's to the 2000's. The stream's flow is not only greater as a result of this urbanization of the landscape, but it is "flashier" as well, with larger variations between low flows and high flows. The Richards-Baker Flashiness Index was developed by scientists at the Water Quality Laboratory at Heidelberg College to measure extremes of stream flow relative to the total flow. This index is independent of rainfall for any given year. The RBFI value for Poplar Creek has seen a steady increase from 1951 to 2005, increasing about 46 percent during
that time period. The Poplar Creek Watershed Coalition has felt the need to address these hydromodification effects on water quality, and has recommended several remedies. Limiting channelization and even de-channelizing certain reaches, where practical, are suggested ways to reduce stream bank erosion. Changing detention basins so they act to decrease release rates during smaller storms is another recommended practice for dealing with hydromodification impacts (CMAP 2007).

5. Biological Assessment

Biological assessments are often done as another way to gauge water quality. Instead of making direct measurements of various pollutants, biological components that are particularly sensitive to water pollution are analyzed. Macroinvertebrates are critical organisms in aquatic ecosystems because they exist near the bottom of the food chain and thus are very important as a food source for fish and other organisms. In addition, these macroinvertebrates are often good indicator species of pollution and some are especially sensitive to water quality degradation. For this reason, macroinvertebrates are often the focus of biological assessments designed to get an overview of water quality in a given stream.

On the main stem of Poplar Creek, macroinvertebrate populations were found to be generally healthy. The South and East Branches, however, were found to have a lower diversity and a poorer habitat than other stretches. This biological assessment was therefore useful in the elusive goal of identifying hot spots, at least with regards to outcomes. Some stretches like the main stem near Jay Street in Elgin were found to have good fish diversity, whereas the stretch near the mouth scored poorly, as did a segment of the stream flowing about halfway through the
Poplar Creek Forest Preserve. Many segments of the stream and its tributaries had no data on fish diversity, however, again illustrating the problem of scientific uncertainty. The stream segments where diversity was the best had the highest gradient, and this has been offered as an explanatory factor due to its affect on stream velocity. Another possible cause for poor diversity near the mouth is the existence of a number of dams along the Fox River, but these are outside the boundaries of the watershed and therefore not open to any action proposed by the PCWC (CMAP 2007).

6. **Recommendations for Improving Water Quality in the Poplar Creek Watershed**

The recommendations for improving water quality in the Poplar Creek Watershed and reducing the impact of the various pollutants discussed above revolve around the implementation of best management practices (BMP's). This is typical of most watershed collaborations that rely on voluntary compliance rather than increased regulation to achieve their goals. In that sense, it is no surprise that BMP's are the favored methods and that curtailing any expected growth in this highly urbanized watershed is completely off the table. The Poplar Creek Watershed Action Plan states this explicitly and makes note of the fact that development projects and land use changes are already in the works and cannot be altered. This is the reality faced when working in an urban watershed, and many consider it a wise decision given the reality of natural resource management in a high-growth area. The PCWC has developed several different strategies depending on the pollutant involved, and I will briefly summarize those here. In keeping with the strategy of acceptance of economic development, this watershed group intends to tailor their BMP's to such growth by relying on "retrofits situations." One example is their plan to improve
structural controls in order to reduce fecal coliform by retrofitting detention ponds, and then monitoring their effectiveness with a goal of 30 percent reduction in the pollutant. The installation of catch-basin inserts with anti-microbial agents is another structural improvement suggested (CMAP 2007).

However, reduction of fecal coliform will not rely so much on structural controls, but rather on the reduction from the identified sources that were mentioned above: pet waste reduction, septic inspection, and goose management. This focus on source reductions goes forward despite the admitted lack of research on its effectiveness. Conversely, there has been some significant research done by the Center for Watershed Protection on the effectiveness of BMP’s. Their studies suggest that dry ponds, wet ponds, and wetland treatment ponds are all similar in their fecal coliform removal efficiency (70-78 percent); and what really matters in all three is increasing detention time, which in turn allows for more settling. Another recommended BMP is the design of inlet and outlet structures to reduce turbulence and re-suspension. Ponds serving multifamily areas should be the focus for the installation of filters at outfalls, because research using the Simple Model shows these types of housing units produce roughly twice as much fecal coliform as single family units or even commercial/industrial enterprises. Finally, soils in the watershed were determined to be unsuitable for effective removal of fecal coliform via infiltration or bioretention methods (CMAP 2007).

Research has shown that most BMP’s have little effect on total dissolved solids such as chloride. In the main stem of Poplar Creek, chloride makes up roughly a third of the TDS load. The main source of chloride is most likely road salt, and therefore the PCWC recommends street sweeping and the use of alternative materials in winter as the primary methods for control. As mentioned above, illicit discharges of silver are suspected as its main source, and the watershed
coalition is relying on the discovery of that source by the appropriate authorities or a voluntary
cessation of such activity due to better education and outreach (CMAP 2007).

As with fecal coliform, recommended control measures for sedimentation in Poplar
Creek include detention basin retrofits to reduce erosion and thus facilitate the settling of
suspended solids. Other recommended actions are the establishment of riparian buffers and
stream bank stabilization, with the latter concentrated in headwater sub-watersheds and in the
Poplar Creek Forest Preserve. Row cropping in the forest preserve was also cited as possible
source of sedimentation. Measures to remove sediment already accumulated were not
recommended. Dredging, for example, was ruled out as too ecologically destructive.
Techniques for increasing stream velocity were mentioned as a possible way to move such
sediment. It was concluded, however, that the effect from increasing in-stream velocity would
be local, and mostly beneficial to habitat rather than in reducing total sediment loads (CMAP
2007).

Like silver, oil and grease sources are suspected of being the result of illegal dumping,
and detection activities by municipalities is mentioned as a possible solution. Nonpoint sources
of oil and grease should be dealt with, as well, and BMP's targeted for commercial, industrial,
and transportation land uses are the main suggested course of action. Two BMP's mentioned
here are "Green BMP's," such as constructed wetlands, and oil/grit separators with absorptive
polymers (CMAP 2007).

High flows due to hydro-modifications have increased storm water rates. The
recommended solution in Poplar Creek for this problem is the use of detention basin retrofits.
These retrofits are needed mostly in areas developed before detention ordinances went into effect.
No site specific methods are recommended for total volume reduction, although municipalities
and other organizations are encouraged to implement these on their own. Infiltration basins and trenches are mentioned as an attractive strategy for water quality treatment and runoff volume reduction, but are dismissed as less than ideal because few soils have the required texture for these methods. Also, many of the potential sites for these retrofits may lack the space to accommodate all of the infiltrating runoff (CMAP 2007).

The third type of measure to combat hydro-modification problems involves disconnecting impervious areas from the storm sewer system and thus reducing runoff volume. Two specific practices listed are rain barrels to capture roof runoff, and the redirection of roof runoff to areas that have some infiltration capacity. It was recommended that these types of measures be targeted to higher density and older developments, and that education and outreach should be the main strategies for implementing these goals (CMAP 2007).

Related to variable flows caused by hydro-modifications are stream and wetland restorations. Recommended stream restoration techniques mentioned here are bank stabilization and minor in-stream practices. The latter includes the installation of riffles, mechanisms to divert or speed-up stream flow, and comprehensive redesigns of channels; including the habitat. The ability of wetlands to store vast amounts of water during a storm event make them ideal for ameliorating the flashy flow regimes resulting from hydromodifications. Like the nation as a whole, only a small percentage of wetlands remain from pre-settlement days. However, the small acreage of wetlands that survived agricultural and urban development over the years can be protected via open space preservation efforts, and by restoration of selected wetlands (CMAP 2007).
Finally, the Poplar Creek Watershed Action Plan (CMAP, 2007) wisely addresses the need to deal with scientific uncertainty by calling for more research in three areas. One recommendation is for a detention basin inventory; but only for those basins designed for flood control or in need of maintenance. The second recommendation is a call to determine the source of fecal coliform by using DNA testing to see if the origin of different sources is human, geese, pets, or others. Lastly, a call is made for the establishment of more upstream sampling sites to better analyze water chemistry geographically, and to assist in attempts to more accurately determine the greatest concentration of pollutant sources (CMAP 2007).
7. Poplar Creek Focus Group

The Poplar Creek Focus Group was conducted on July 9, 2008, in the offices of one of the participants in Schaumburg, Illinois; a town located within the watershed. The six participants were all volunteers who had good knowledge of the problems and issues related to the Poplar Creek Watershed. As with the other two focus groups, the aim was to get knowledgeable participants or non-participants in order to elicit their input on legitimacy related issues in the watershed. I was not necessarily looking only for direct participants in the Poplar
Creek Watershed Coalition (PCWC), but at the same time I did not want the input of general citizens unaware of watershed issues. Most citizens would not have the background, experience or knowledge required in order to provide useful information on legitimacy issues in the watershed. As with the other two focus groups, my results suffer from the potential bias of voluntary participation, but the goal was to get as much information as possible from those with the appropriate know-how. In that case a reliance on volunteers is often the only thing that can be counted on. The identities of the focus group volunteers is being guarded in order to protect their privacy, but a brief description of each participant and his or her association with related agencies or organizations is provided below. Each focus group member was contacted from an email list provided to me by watershed group leaders.

**Participant A** = Professional employee of a federal agency involved in water quality and resource management issues, and member of the Poplar Creek Watershed Coalition (PCWC).

**Participant B** = Professional employee of a village located within the Poplar Creek Watershed, and member of the Poplar Creek Watershed Coalition (PCWC).

**Participant C** = Local citizen and member of the Poplar Creek Watershed Coalition (PCWC)

**Participant D** = Local citizen and member of the Poplar Creek Watershed Coalition (PCWC)

**Participant E** = Local citizen and member of the Poplar Creek Watershed Coalition (PCWC)

**Participant F** = Professional employee of a regional planning agency involved in water quality and resource management issues, and member of the Poplar Creek Watershed Coalition (PCWC).
8. **Poplar Creek Hypotheses: Themes and Indicators**

Relying on the work of Bernard Berelson (1951), I have organized my qualitative analysis into scientific hypotheses and laid out the supporting indicators (communication content in the focus group) for each hypothesis. In this study, which is mainly exploratory, the indicators do not prove the hypotheses, but rather show these are issues of concern that should be investigated further in later studies that can be used to generalize over a larger region. For each hypothesis I have listed a few key indicators from the focus groups that spurred me to make these hypotheses. Other indicators from the text of the focus group transcripts are listed in the Appendix A. The main hypotheses and their indicators for this focus group are listed below and developed more fully in the next section of this chapter. Like the two other watershed groups in my qualitative analysis, watershed collaboration efforts in the Poplar Creek have had a great deal of success, but trouble spots and areas of concern remain. The hypotheses described below involve both successes and potential problems for The Poplar Creek Watershed Coalition.

**Hypotheses Indicating Successful Collaboration**

1. Supporting Institutions, Capacity Building and Nested Hierarchy of Scale; in addition to Scientific Expertise and Local Knowledge used at the Appropriate Scale
2. Quality Representation and Government Involvement
3. Strong and Effective Leadership
4. Effective Outreach and Education
5. Trust between Stakeholders
Hypotheses Indicating Potential Legitimacy Problems

(6) Accountability and Future Outcomes
(7) Compliance – The Role of Government Regulations versus Collaboration
(8) Role of Science and Uncertainty
(9) Funding - Double Edged Sword

Hypothesis: Capacity Building Efforts and Scientific Expertise provided by several Umbrella Organizations and Government Agencies have Facilitated Successful Collaboration and Project Implementation within the Poplar Creek Watershed.

Hypothesis: Coordination between Umbrella Groups and the Poplar Creek Watershed Coalition led to the Effective use of both Scientific Expertise and Local Knowledge at the Appropriate Scales.

Themes: Capacity Building and Scientific Expertise from Agencies and Organizations

One of the reasons the Poplar Creek Watershed Coalition (PCWC) has been successful in some of its implementation projects and has survived such a long period of time is due partly to assistance from several other organizations. Among the different organizations that have provided PCWC scientific expertise, funding, and other types of capacity building: are the Fox River Ecosystem Partnership (FREP), the Chicago Metropolitan Area Planning Commission (CMAP), the Fox River Study Group, the Natural Resource Conservation Service (NRCS), the Forest Preserve District of Cook County, and the Illinois Environmental Protection Agency (IEPA). Different village governments located within the Poplar Creek Watershed have also
contributed capacity building in different ways. Among the villages that have been particularly helpful with regards to capacity building are Hoffman Estates, Schaumburg, South Barrington, and Streamwood. Two organizations mentioned several times in the focus group discussions were FREP and CMAP (formerly the Northeastern Illinois Planning Commission or NIPC), and most of the indicators below refer to their scientific and funding assistance in the workings of the PCWC.

**Themes: Nested Scale Hierarchy and the Use of both Scientific Expertise and Local Knowledge at the Appropriate Scale**

Related to the concept of capacity building is the role of scale in watershed activities, a major focus of this dissertation. I found that a nested scale was effectively utilized by all three watershed groups studied in this paper. Smaller scale groups conducted monitoring efforts and provided local knowledge, while large basin groups contributed capacity building efforts that included funding and scientific expertise. In the Poplar Creek Watershed, there was good coordination between PCWC and umbrella groups like FREP and CMAP. Their total efforts involved both the use of local knowledge and scientific expertise. Thus, this collaboration is a good example of the use of nested scale for involving people and expertise at both the larger basin scale and the smaller watershed scale.

**Indicators: Capacity Building and Scientific Expertise**

It was generally agreed upon, however, that the smaller scale (scale of Poplar Creek Watershed) was preferable to the larger basin scale (Fox River Basin) for conducting many of the
watershed protection activities that PWCW was involved with. At the same time, the participants also agreed that the correct scale for dealing with water quality problems depended on the issue under investigation. Below are a few of the main indicators related to capacity building and scientific expertise. The rest of the indicators are located in Appendix C.

"They (FREP) had lots of questions and corrections and little things like that. I loved their input."

"____, ______, and __________ started working with the Fox River Ecosystem years ago and we were integral; we watched what they did, went to all their meetings tried to emulate it on the watershed size. We still have a great relationship with them."

"Our involvement with CMAP just helped to facilitate where we were going. It was voluntary action on everybody's part."

"At NRCS there are questions of what they can do better, not just to establish watershed plans."

**Indicators: Use of Local Knowledge and Scientific Expertise within a Nested Scale**

**Hierarchy**

“Would you be doing what you did at Fox River Ecosystem Partnership, the Fox River basin scale? (participant 1 asks)------“No, probably not, it’s too far away.” (Participant 2)
“Not to put words in your mouth, but it sounds like it’s not local enough.” (Participant 1)

“Ya” (Participant 2) ------ “I would think so. (Participant 3)”

“It’s (the decision of what scale to operate at) is driven by the issue. What’s the crisis, what’s the issue? And that can happen at multiple scales. So it helps to organize activities around the Fox River or the Fox River Study Group. So the Salt Creek Dupage Work Group and the Fox River Study are great examples of a very strong basin scale river organization.”

Quality Representation and Inclusiveness

Hypothesis: “Quality Representation involves Personnel who lack a Personal Agenda during deliberations, and this works to sustain the Watershed Collaboration Process.”

Hypothesis : “Involvement of various village officials in the watershed group increased its Legitimacy and Collaborative success, as the PCWC went from a purely grassroots organization (Citizen based according to Koontz and Moore 2005) to a hybrid group.”

Themes: Quality of Representation and Lack of Agenda

The type of representation used for deliberations involving watershed issues can make or break collaborative organizations, according to literature review on this subject. For this reason, the topic was presented to the Poplar Creek Focus Group participants and the comments made
about representation from various villages and governmental agencies were very positive. Inclusive and good quality representation was often cited by focus group participants as one reason for the success of the PCWC. All of the focus group participants were adamant that none of the village representatives or agency personal involved in the Poplar Creek Watershed had any kind of personal or hidden agenda. Thus, the quality of representation was generally considered to be of high quality; with the various constituents such as village residents or government agencies well-represented by the different personnel sitting at the table. The different representatives also worked well together, which added to the level of trust; a concept I will describe in greater detail later in this paper. Again, the length of time that the PCWC has survived, something I call its “sustainability,” has been greatly enhanced by good quality representation according to the participants in this focus group. Below are some of the indicators supporting hypothesis 2A above, which centers on the importance of such representation in the long-term survivability and success of the watershed group.

Themes: Inclusion of Local Village Officials and Other Agency Personnel

Related to the concept of quality representations is the idea of involving different municipalities and government agencies in the collaborative process. As mentioned before, the Poplar Creek Watershed Coalition (PCWC) started out as a group of concerned citizens taking on “city hall” so to speak, with their advocacy of resource protection when development projects were being proposed. Over time, however, a decision was made by the original group to partner with various villages and other governmental agencies operating within the watershed, such as NRCS and the Forest Preserve District, in order to increase the influence and power of the group.
Eventually, the resident members meshed well with the various village officials and other agency personnel. This is also cited here by members of the focus group team as a major reason for the long-term success of the PCWC. The indicators supporting the hypothesis 2B cited above are also found below.

**Indicators: Quality Representation**

“As far as constituents, they were representatives of an agency or municipality. Most (village reps) would say that you (they) are representing someone (other than yourself). Your (representatives) opinion is what your municipality wants.”

“I think I have support from the village board, I probably do. But, I get the feeling the whole village is behind the environmental wave at Streamwood.”

**Indicators: Inclusiveness of Government and Village Officials**

"Not many of them (village officials) did attend, but those that did learned something about it (watershed group) -- so by having it at their premises, in their town really helped (get some village representation/participation)."

“If you want to have a plan with some teeth in it, get more municipalities on board then. Once the mayor and the village board began to see the benefits of all this and John came to this group and we had NIPC - now CMAP - he had a lot more credibility himself in his own community. And he could ask more things in the plan.”
Strong and Effective Leadership and Changes in Leadership over Time

Hypothesis: “Strong and Effective Leadership facilitated Watershed Collaborative success within the PCWC, but some leadership was lost later in the Collaborative Process.”

Themes: Strong and Effective Leadership and Changes over Time

Just like the other two focus groups, the positive role played by strong and effective leadership was cited as an important factor in facilitating long-term sustainable success within the PCWC. Some of that leadership relates to the concept of capacity building described earlier, in that some endeavors were led by professionals in supporting umbrella organizations such as FREP and CMAP. Other sources of leadership emanated from villages officials operating within the watershed. However, the leadership within the group itself was also cited for its tenacity and skill, and sustained the group long before it merged with government agencies into a hybrid group. This early leadership, when the group was citizen-based only, was cited as a reason it was able to survive and eventually come together with various government entities into its present form.

At the same time, some focus group participants expressed concern that after a certain point in time some leadership, particularly from the supporting umbrella groups, moves away from group activities and goes to work on other projects. This leads to a lack of follow through, and thus to a lack of accountability for plans formulated during this time. One participant, as shown in the indicators below, described it as a loss of “momentum” for the plan.” There was also some concern expressed regarding possible confusion about who ultimately is accountable for the plan at some later date in the collaborative process.
Indicators: Strong and Effective Leadership and Changes over Time

“And this is where _____ really made a push because she lives in the area and she had her high school students give presentations to the village board about development and water quality and protection and sustainability and all these great things. She really paved the way.”

“____________’s ideas they originated in Streamwood and we learned from him. We learned from him. It wasn’t the group teaching ______. ________ taught us.”

“They came in and helped educate the village board.”

“I project (protect) my time, and I have sort of backed away from the Poplar Creek.”

Education and Outreach

Hypothesis: “The Early Success of the Watershed Group was due mostly to Education and Outreach Efforts. Members of the Group were most comfortable with this Type of Activity”

Themes: Education, and Education

Education and Outreach seem to be common denominators for the success of the three watershed groups, and that was emphasized by the focus group for Poplar Creek, as well. In this group, however, the importance of education and outreach for PCWC’s early successes was also discussed. One focus group member who was a citizen participant before the PCWC evolved
into a hybrid organization, talked about how people in the group were most comfortable with education and outreach and how those activities sustained them and gave them momentum for future endeavors. Adding to the comfort level of these early PCWC participants was the fact that education and outreach efforts were well received by people in the watershed. Once the group did evolve from a citizen-based group to a hybrid group, however, education and outreach received another boost from technical and scientific experts working for villages and other agencies involved with PCWC. Thus, education and outreach efforts continued to be the focus of the watershed group. This is not surprising considering the degree that such collaborations rely on voluntary compliance rather than strict regulation. This distaste for additional regulations is another reason why education and outreach occupied such a prominent position within the PCWC. One agency personnel, however, did complain about the lack of enforcement on current regulations, suggesting that such a heavy emphasis on education and outreach was at least partly due to the lack of success in forcing compliance based on regulations already on the books. The topic of regulations versus voluntary compliance is discussed further on in this section. Below are a few key indicators for education and outreach, but most are located in Appendix C.

**Indicators: Education and Outreach: Keys for Early Success and a Present Day Focus**

“We started educational programs first because that is what we felt most comfortable doing.”

“And that is where we felt most welcome------went out and did educational programs with citizens --- and that is where we really started to reach the community.”
“They (village scientific experts and CMAP personnel) came in and helped educate the village board.”

“_______’s ideas, they originated in ____________(a village in the watershed) and we learned from him. We learned from him. It wasn’t the group teaching ________.”

“And one of the most important things mentioned here (in the draft of the plan) is that they (citizens in the watershed) have to have stake in the sustainable use of natural resources: including clean water-----clean and safe water. So, I think you really can’t admonish people. But to move people to change their personal everyday life-----I think it comes about with education and knowledge.”

Trust versus Scientific Uncertainty

Hypothesis: “Collaborative Efforts were Sustained because Agency Personnel and Group Members Trusted Each Other and worked well together. However, one Small Area of Distrust centered on Scientific Uncertainty and Assigning Blame to Municipalities for Water Quality Problems”

Themes: Trust and Working Together

There seemed to be a high level of trust between participants in the Poplar Creek Coalition according to the focus group volunteers. Comments revolved around the idea that nobody seemed to have a “hidden” agenda or kept “secrets” from other members and municipalities. Although some rivalry between municipalities was mentioned, this did not
transform into destructive “competition,” and was cited as a major reason for the high level of trust in PCWC. Fostering such trust were the personalities of the various agency and municipality representatives. One focus group volunteer used the term “meshed” to describe the relationship between the Poplar Creek Watershed Coalition members. It was also stated that trust increased over time as these representatives worked well together and enhanced the positive view they held towards each other. One municipality, however, was cited as not being very cooperative towards the watershed coalition and it was it was a good thing they only encompassed a small portion of the watershed. It was also added that if this one village had encompassed a larger percentage of the watershed it could have posed a problem. This statement is significant in that it illustrates the fragile nature of these consensus-based groups and their reliance on voluntary-compliance, from not only individuals within the watershed, but with regards to governmental entities as well.

There was some lack of trust expressed with regards to the issue of scientific uncertainty. Because the monitoring stations were all far downstream on Poplar Creek there was no way to apportion blame to any one part (municipality) of the watershed. Environmental problems are typically fraught with such uncertainty due to the complex nature of ecological systems. Poplar Creek suffered from such uncertainty and it definitely affected trust levels in a negative way. However, due to the strength of personality attachments and a high overall level of trust, this problem seemed to be more subdued than it might have been.

Finally, the issue of trust is closely connected to two other themes described earlier, capacity building and quality of representation. One of the reasons why trust increased over time was due to the capacity building efforts of umbrella organizations such as FREP and CMAP. Representatives from these organizations were well-respected and liked by other members of
PCWC not only due to the “meshing” of personalities, as mentioned earlier, but also because of the great technical and scientific expertise they afforded other group members and municipalities. The FREP and CMAP group participants, as well as those from local municipalities and the original Poplar Creek citizen members, were all of very high quality and operated in a very professional and above-board manner. This quality of representation, which was discussed earlier, is undoubtedly one reason why trust was so high within the Poplar Creel Watershed Coalition.

**Indicators: Trust and Working Together**

“The personalities of people really meshed well. We did not have anyone from certain municipalities that were in competition with other municipalities or anything else our might fear would happen when you cross a dividing line (town line).”

“There are rivalries between groups, communities in this area. That extends way before any of us were involved in any of this and I think we were able to, because of people’s personalities, never had any of this interference with what we were doing.”

“There was one community in particular that did not participate. But fortunately, they were not a big percentage of the watershed. If they were (bigger part of watershed) it might have been more of a problem.”
“The station that was capturing data on water quality was far enough downstream that it represented the whole watershed as opposed to saying, you know it is really just coming from this part or that part, so because we really did not have good data resolution you could say that there was some distrust or skepticism as to who was responsible for the problem.”

**Accountability and Future Outcomes**

**Hypothesis: “Concerns about Lack of Accountability and Its Negative Impact on Future Outcomes emerged as a Potential Threat to Long-Term Collaborative Sustainability”**

**Themes: Accountability and Future Outcomes**

Related to the leadership problems discussed in #3 are worries about who takes control over the watershed plans once they are developed, and who is accountable for future outcomes. There were discussions in the focus group that centered on the lack of accountability and follow-up for watershed plans, and the fact that some leaders backed away from the process at later points in time due to other responsibilities. This problem was not mentioned in the other two focus groups; the debate here was unique to Poplar Creek. So, while umbrella groups and supporting institutions were very helpful with capacity building functions, and contributed effective leadership for the group, they often backed away from the collaborative process at some point down the road. This led to a kind of uncertainty regarding accountability and future outcomes. The worry expressed was that a lack of accountability could have negative consequences regarding implementation of BMP’s and other measures critical to future outcomes.

Among this small group of focus group members, all of whom knew and apparently liked each another, there developed some disagreement regarding this accountability issue and its
effect on future outcomes. Some members felt the plan itself addressed this accountability issue with future-mandated action. One focus group member, however, felt that these were just “words on paper” and did not represent any real accountability, and thus future outcomes were left in doubt. Another focus group member talked about the need to keep a “fire burning under it,” referring to the implementation of the PWCW plan. He felt there was a danger that the plan could be forgotten if someone did not take responsibility for it. Other comments centered on the danger of the plan “losing momentum” if personnel who were integral in the initial stages of plan development decided to “step away from it” for various reasons. It should be stressed that some key individuals in the planning process are employees of agencies which are involved in many activities. Thus, they also are limited by their time and must by necessity turn their efforts to other projects at a later date. Finally, lack of funding was also mentioned as a reason why plans might be shelved. The funding issue will be discussed in greater detail in a later section. Below are some indicators related to accountability for future outcomes. Other indicators for this are in Appendix C.

**Indicators: Accountability and Future Outcomes**

“Yea, this is going to sit on the shelf until funding comes along.”

“I project my time, and I have sort of backed away from Poplar Creek.”

“But is there is an implementation strategy in there?”
“Yea, there is (an implementation strategy).”

“Most of those recommendations (in the plan) have a time frame for priority level.”

“I am thinking more of the group.”

“Well, here is what it says (reading from the plan), “It is expected that the Poplar Creek Coalition will meet at least quarterly. An annual meeting that involves evaluation by CMAP is recommended to help make sure that implementation is on track.”

“But that (citing above) is not a plan. That is just a statement ------- I am talking about a serious---- because this happens everywhere (other similar watershed group plans) ----- It takes a more thorough, almost another process. To figure out who is going to take responsibility for it (the plan).”

“As I think about it, that (confusion about ultimate authority and follow-up of the plan) might be one of the downsides to having a purely voluntary, bottom-up organization.”

**Compliance: The Role of Government Regulations versus Collaboration**

**Hypothesis:** “There is a Strong Preference for Voluntary Compliance within the Watershed and an Aversion to more Government Regulation. However, Concern was expressed that a Reliance on Voluntary Collaboration was necessitated partly due to Poor Enforcement of Existing Regulations.”
Because watershed collaborations typically rely so heavily on voluntary compliance, I purposely brought up the topic of government regulations in the focus group as a possible alternative to such voluntary efforts. The prevailing opinion in the group was one of keeping on track with voluntary compliance efforts, and not attempting to instill or rely more on government regulations. One PCWC member bristled at the idea of more stringent regulations and stated that greater regulations would require “snitching” on the part of citizens, and expressed strong reservations about such a strategy.

One other focus group member, however, was not so enthusiastic about relying on voluntary compliance and stated a belief that collaborative, voluntary efforts often take precedence because existing regulations go unenforced. In those cases, then, watershed groups were left with no option other than a voluntary compliance approach. This focus group member expressed frustration with the lack of enforcement of existing regulations, and seemed to represent the most significant skepticism regarding watershed collaboration within the focus group. This member was an active participant in the watershed collaborative effort and thus had a vested interest in the success of these efforts, as did the others, but he still seemed to have a greater affinity than the others for the use of traditional regulations. Conversely, he seemed to have some doubts about the overall future success of watershed collaborations, although I should emphasize that these doubts were implied and not specifically stated.

This idea that collaboration may be a “fallback” option because governments do not have the stomach to strictly enforce regulations regarding water quality is an interesting concept that warrants further investigation. The role of political expediency and resentment against greater
governmental intervention, even by people passionately concerned with protection of natural resources, may have been seriously overlooked in the analysis of watershed collaborations. I do not remember that topic being addressed in any papers I read for the literature review of this research project. The importance of this potential resentment against governmental actions is well represented by the “snitch” comments made by a PCWC member regarding the possibility of greater regulations. However, as mentioned earlier for the Wisconsin watersheds, other people were annoyed that government agencies were not more proactive in reducing pollution. This was reinforced here by the comments of a focus group member who (see indicators right below) was frustrated at the lack of enforcement of existing regulations, and felt voluntary methods were relied upon partly due to lack of enforcement of existing laws.

**Indicators: Compliance, Government Regulations and Voluntary Collaboration**

“And say, look you said you would do this and now we are going to call the national EPA on you or we are going to bring charges against your municipality because you did not adhere to the plan. I don’t think forced voluntarism of the plan will make any watershed plan more valuable or viable.”

“There is a reason there are regulations because things that were not being done voluntarily. So, I would like to see people enforce the regulations that already exist.”

“That’s on the books -- that’s regulation, but it is totally ignored. Yep, they don’t have a slip. They are not complying with that, any components of it. We have an argument with IEPA to do
it, but --------. It’s disheartening to see that there are regulations there, and nobody complies and there is no enforcement.”

The Role of Science and Uncertainty

Hypothesis: “Scientific Uncertainty Regarding Apportioning Blame for Water Pollution was a Significant Issue that Worked Against Trust”

Themes: Scientific Uncertainty and Apportioning Blame

It was mentioned above that there was a high level of trust between agencies and individuals in the watershed, but there was one concept that did work against this trust and created some legitimacy problems in Poplar Creek: scientific uncertainty. Despite the relative goodwill of village representatives toward one another, some trust issues developed due to the inability of scientific experts to accurately apportion blame when it came to pollutant loads in Poplar Creek. One of the main reasons for this uncertainty was the poor location and paucity of water monitoring stations in Poplar Creek, which was also discussed in the introductory part of this write-up. The small number of water monitoring stations in the Poplar Creek Watershed (6) was aggravated by the fact that they were concentrated downstream. Downstream locations will collect pollutants from all parts of the watershed, both upper trunk areas and tributaries, and thus are not good for apportioning blame. This lack of scientific specificity regarding the origin of pollutants tended to result in a sort of blame-game according to a brief discussion on this topic during the Focus Group. This blame-game in turn led to resentment on the part of others who rejected these accusations, knowing full well they were not backed up by scientific proof.
One focus group volunteer who worked for a village in the watershed resented the fact that others pointed to a specific project within his jurisdiction as the source of all sedimentation problems in the watershed. This individual was not only resentful, but understandably shocked that anybody would be bold enough to apportion all the blame for the stream’s pollution to one project given the lack of data to back up such a claim. In addition, this village had held the project in question to strict guidelines regarding erosion and sediment control, which added to the lack of trust between the village in question and those making the claim. This one instance illustrates the type of legitimacy problems that can occur when scientific data are insufficient and knowledge is uncertain, to the point that people want to blame others knowing full well there is no way to disprove their claims. In this manner, lack of scientific uncertainty can lead to loss of trust and social capital, and hurt watershed collaborations in more ways than a simple lack of data. Below are some indicators for scientific uncertainty.

**Indicators: Scientific Uncertainty**

“The station that was capturing data on water quality was far enough downstream that it represented the whole watershed as opposed to saying, you know it is really just coming from this part or that part, so because we really did not have good data resolution you say that there is some mistrust or skepticism as to who was responsible for the problem.”

“Uncertainty about whether this or particular area was responsible for the error, or to what degree they might be responsible ---- and we did not have good data resolution to winnow this out.”
“And he said something about ever since the restaurant mall project on ______ and ______(street names). I felt so guilty because that is ___________ (name of town where he works). I thought, wait a second, we put up erosion control, we are trying to control the sediment. He said that one project single handed tipped Poplar Creek over to the bad side. Holy Cow! Really, just the one project? I remember that. I will never forget it because it just hit me. I did not worry about it too much because we are such a small part of the watershed.”

**Funding: A Double Edged Sword**

**Hypothesis:** “Funding acted as a Double Edged Sword by furthering Watershed Group Goals when available, but Follow-up and Accountability suffered if Funding was not forthcoming”

**Themes:** Funding, Accountability and Outcomes

Related to the role of government and capacity building, is the part played by funding in watershed collaborations. Lacking regulatory authority, watershed groups like the PCWC strongly rely on funding in order to implement best management practices and to continue educational and outreach efforts, both of which are a big part of the strategy for improving water quality. This focus group gave me the sense that organizations such as PCWC are dependent upon such funding for their success, and that if funding is not available future outcomes would suffer greatly. Lack of funding also contributed to a lack of accountability and cast doubt on possible future outcomes, which were discussed above. Denial of funding seemed to threaten follow-up actions necessary for full implementation of whatever actions the watershed group deemed essential. As described earlier, one participant said that if funding does not become
available for follow-up actions the plan just “sits on the shelf.” It was this plan that some members of the focus group pointed to as a method for attaining accountability. Yet, everybody here seemed to agree that lack of funding is a threat to such a plan. Some of the comments listed below were also listed under accountability and outcomes, but are listed here again due to the close connection between funding, accountability, and outcomes.

**Indicators: Funding – A Double Edged Sword**

“But as when we became a group with _____ (CMAP), we had funding potential.”

“It was huge advantage --- because you (NRCS) got funding.” (second participant) “Right”

“My agency (CMAP) secured a 319 grant from IEPA.”

“There’s a bunch of goals and there is an action plan, but it takes funding. And right now without funding this document just sits.”

“And I actually prepared a 319 Grant Application but it was not chosen for funding”

“It was a good looking application. We had a nice plan to eliminate the sediment problem, but without funding it is not going to happen.”

“Ya, this is all going to sit on the shelf unless some funding comes along.”
9. Conclusions

Like the other two watershed groups studied in the paper, the Poplar Creek group benefited from strong leadership and existing institutions. In the case of the other two larger basin groups, the existing educational institutions and governmental agencies provided scientific capacity and other means of support at the same scale as the partnership. Being a much smaller group, the Poplar Creek Watershed Coalition operated under the umbrella of larger basin-wide institutions, but at the sub-watershed scale. For this reason, the Poplar Creek case illustrates a good example of collaboration at both the large and small scales. A nested hierarchy approach was utilized effectively, with scientific expertise at the larger scale being coordinated with local knowledge at the smaller sub-watershed scale.

Of particular usefulness were the various umbrella organizations and governmental agencies: such as FREP, CMAP, IEPA and NRCS. The expertise and scientific capacity of these organizations helped PCWC transform itself from a citizen-based collaboration to a hybrid-group containing more agency involvement. These groups also provided much of the leadership that was also so important for the Rock River Basin and the SE Fox.

Other successes within the PCWC were the high degree of involvement and cooperation from municipalities in the watershed, the large amount of trust that existed between various governmental representatives and PCWC personnel, and the effectiveness of education and outreach programs within the watershed. Education and outreach were the first goals of PCWC during its early phase, and continued in importance and remained an example of success even as the group got larger and more complex.
Representation seemed to meet the two key criteria required for legitimacy as indicated by the literature, inclusiveness and quality. Inclusiveness for most stakeholders was good with the exception of one municipality within the watershed. Representation quality was good as well, as evidenced by the lack of an agenda by the various government representatives, as well as by their effectiveness in advocating for their perspective government entities. However, the disparity between the demographics of the watershed (all citizens) and the survey respondents (most of who are group participants) was the greatest for Poplar Creek Watershed Coalition among all three watershed groups. As will be discussed in a later section, the urban Poplar Creek watershed has a significantly higher percentage of minority groups, none of whom are represented within the Poplar Creek Watershed Coalition. It has the smallest percentage of whites (41%) of the three watersheds, yet all of the group participants are white. This disparity creates a huge legitimacy problem that will be discussed in later sections dealing with survey results and demographic analysis.

But while leadership, capacity building, supporting institutions, and outreach were all examples of success, some concerns did emerge from the focus group process. One of these areas of concern was the issue of accountability, in that future outcomes and plan implementation were not necessarily guaranteed. In addition, there were worries about changes in personnel at umbrella organizations and how loss of continuity could put outcomes in doubt.

Scientific uncertainty was another issue brought up during the focus group meeting. Due to a paucity of monitoring stations, it is very difficult to identify source regions for contaminants. For example, one municipality blamed another for water quality problems in the Poplar Creek, and a lack of geographically precise data regarding the source of pollutants allowed them to do so. Absent more precise data within the watershed, such blame games were easy to do and took
away from the normally high level of trust between the various stakeholders in the Poplar Creek Watershed.

Finally, two other issues of concern were compliance and funding. Whereas most of the focus group participants felt that increased government regulation would damage the trust and goals of the collaboration, at least one person felt that poor enforcement of existing regulations was a major reason why there was such a heavy reliance on incentive-based collaborative efforts to improve water quality. Although he did not state it directly in the focus group, I sensed from his comments and tone that he was pessimistic regarding future successes using this voluntary-only approach. Funding was a double-edged sword in that its presence could assure successful implementation of projects on the ground, but a denial of the same type of funding, typically from government sources, could doom a project to failure. Collaborative-based groups like the PCWC are highly dependent on funding for their incentive-based mechanisms and projects. Money that could otherwise be spent on regulation is used for these incentive-based programs. Without such funding, it may be foolish for us to think improvements in water quality can occur. If watershed partnerships are an attempt to save government resources and achieve watershed improvement goals on the cheap, the entire collaborative-based approach could be at risk.

Below is a table (Table 5.1) that shows themes common to all three focus groups, and my assessment regarding this theme’s threat to overall legitimacy in the three watersheds. In this table, my assessment is based on my interpretation of focus group results, as well as a review of the themes in my notes which were formulated from these group discussions. An X indicates this theme occurred or was discussed in the focus group for that watershed group. In the table, a large letter P indicates this theme was mostly a positive impact on watershed collaboration, while an N indicates a negative effect. If the effect can cut both ways, a large letter B for both is listed.
If the factor was not discussed in the focus group the space is left blank. However, it should be noted that an absence of that factor is not proof that is was not applicable to that watershed, but rather it was not discussed in the focus group.

**Table 5.1 - Summary Table of Common Themes**: P = Positive Factor, N = Negative Factor, B = Both positive and negative, and Blank Space = No factor discussed in group.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Rock River</th>
<th>SE Fox</th>
<th>Poplar Creek</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Diversity</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Scale and Participation</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Context of Distrust</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Success in Enhancing Trust</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Consensus – Time Needed</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus - Avoiding Issues</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus – Not Unanimity</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus – Better Results</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairness – Just Outcomes</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Leadership</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Scale -The Nested Approach</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Role of Government</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Proximity to Water</td>
<td></td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Voluntary Compliance</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Fragmentation - Jurisdiction</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Conflict of Property Rights</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Outreach and Education</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Quality of Representation</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Scientific Uncertainty Creates Distrust</td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Accountability</td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Capacity Building and Scientific Expertise</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Voluntary Participation Bias</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Use of Local Knowledge</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Inclusive of All Stakeholders</td>
<td>N</td>
<td>N</td>
<td>P</td>
</tr>
</tbody>
</table>
Because I am presenting the findings of the focus group communications, I limit my conclusions to what was said in these groups. Survey findings and further discussions may discover more factors, but if the topic was not covered in the focus groups it received a blank in the table above. For example, accountability was only discussed in the focus group for Poplar Creek in Illinois, but I strongly suspect from other communications and the survey results that it was an issue in Rock River and the SE Fox, as well. This is acceptable, in my opinion, because my research is exploratory and serves more as a pilot study. As such, the goal is to ferret out issues and problems, and a comprehensive cataloging of all key issues for all three watersheds is not entirely necessary. Still, the summary table serves to quickly illustrate all the issues discussed.
CHAPTER 6
SURVEY DATA: ANALYSIS AND RESULTS

Survey results below will be divided into several categories for analysis. First, the legitimacy index (LI) will be examined and the LI values for each of the three watersheds will be compared and discussed. Also, the results will be compared between the LI values derived using survey respondent weights versus those derived from the literature. Second, the results of statistical analyses conducted to determine the effect of scale, consensus, and participatory diversity on legitimacy (LI values) will be presented. In addition, tests on the impact of these three variables on each other and other elements of legitimacy will be examined. Third, a comparison of certain demographic factors (income, education, race, and gender) for survey respondents versus all citizens will be conducted in each of the three watersheds. Fourth, each of the twelve elements of legitimacy will be investigated, and the success and failure of these variables within the watersheds will be analyzed. Finally, results related to the role of government will be studied and its future in watershed collaborations discussed.

(A) Legitimacy Index Results

1. LI Values for the Respondents – Two Weighting Methods

The Legitimacy Index Values were calculated using the two different weighting systems described earlier in Chapter 4, survey-generated weights and weights derived from the literature review. The LI values for these methods are shown below for the 49 respondents who answered
all the questions that were used to calculate perceived legitimacy. The survey respondents were kept anonymous and only a survey-assigned number differentiates each respondent from the others. Remember, the LI survey weighting system used a two-step process that involved multiplying the Likert value selected by each respondent for that element of legitimacy, and then multiplying by the weight. Survey weights were determined by survey respondents’ ranking of the elements (Questions 10-1 and 10-2). The exact calculation procedure for survey respondent weights can be seen in a prior section of this paper, Chapter 4, D2. For the literature review weighted LI values, the Likert value for each element of legitimacy was multiplied by the literature review weight for that element. The literature review weights were determined by my interpretation of the literature concerning the relative importance of each element of legitimacy.

2. Summary of LI Values and LI Averages for Each Watershed

A summary LI value was calculated for each of the 49 respondents. The Likert ranking chosen by each respondent (1-7) was multiplied by the weight for that element to get an element value. Then, that element value (weight times ranking) was added up with all the other element values to get a final summary LI value for that respondent. A total LI value was calculated for each respondent using both weighting systems. In the table 6.1 shown below, the LI values (both weighting methods) for each respondent are listed, along with the respondent’s watershed and the scale (small, medium, or large) of the respondent’s watershed. Remember, some participants worked within smaller scale nested watershed groups, and so some participants were working on issues specific to their smaller watershed, in addition to meeting with other basin-scale representatives to deal with larger-scale issues. Also, the last column identifies if that survey
respondent came from a consensus-based watershed group or a non-consensus group. The mean LI values for all 49 respondents were also calculated for both survey weights and literature review weights, and can be seen at the bottom of the chart. Notice that the average LI value using the survey weighting system (57.64) and the literature review weighting system (58.72) are very similar, but any differences will be tested statistically in section 4 below.

Table 6.1 - Legitimacy Index (LI) Values for All 49 Respondents -

<table>
<thead>
<tr>
<th>ID #</th>
<th>LI-Survey</th>
<th>LI-Literature</th>
<th>Watershed</th>
<th>Scale</th>
<th>Consensus-Based</th>
</tr>
</thead>
</table>
Table 6.1 Continued

<table>
<thead>
<tr>
<th>ID #</th>
<th>LI -Survey</th>
<th>LI-Literature</th>
<th>Watershed</th>
<th>Scale</th>
<th>Consensus-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>62.60</td>
<td>66.75</td>
<td>SE Fox</td>
<td>Medium</td>
<td>No</td>
</tr>
<tr>
<td>31</td>
<td>62.00</td>
<td>65.50</td>
<td>Poplar Creek</td>
<td>Large</td>
<td>No</td>
</tr>
<tr>
<td>32</td>
<td>60.30</td>
<td>63.75</td>
<td>Poplar Creek</td>
<td>Small</td>
<td>No</td>
</tr>
<tr>
<td>33</td>
<td>62.05</td>
<td>64.00</td>
<td>Poplar Creek</td>
<td>Small</td>
<td>Yes</td>
</tr>
<tr>
<td>34</td>
<td>39.70</td>
<td>42.00</td>
<td>Poplar Creek</td>
<td>Small</td>
<td>No</td>
</tr>
<tr>
<td>35</td>
<td>53.40</td>
<td>54.75</td>
<td>Poplar Creek</td>
<td>Small</td>
<td>Yes</td>
</tr>
<tr>
<td>36</td>
<td>61.45</td>
<td>64.25</td>
<td>Poplar Creek</td>
<td>Small</td>
<td>Yes</td>
</tr>
<tr>
<td>37</td>
<td>59.35</td>
<td>60.00</td>
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</tr>
<tr>
<td>38</td>
<td>46.10</td>
<td>48.75</td>
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</tr>
<tr>
<td>39</td>
<td>60.30</td>
<td>65.00</td>
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</tr>
<tr>
<td>40</td>
<td>55.95</td>
<td>56.50</td>
<td>Poplar Creek</td>
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<td>Yes</td>
</tr>
<tr>
<td>41</td>
<td>56.55</td>
<td>58.00</td>
<td>Poplar Creek</td>
<td>Medium</td>
<td>No</td>
</tr>
<tr>
<td>42</td>
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<td>64.00</td>
<td>Poplar Creek</td>
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<td>No</td>
</tr>
<tr>
<td>43</td>
<td>61.85</td>
<td>66.00</td>
<td>Poplar Creek</td>
<td>Large</td>
<td>Yes</td>
</tr>
<tr>
<td>44</td>
<td>52.25</td>
<td>52.00</td>
<td>Poplar Creek</td>
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<td>No</td>
</tr>
<tr>
<td>45</td>
<td>55.85</td>
<td>59.75</td>
<td>Poplar Creek</td>
<td>Small</td>
<td>No</td>
</tr>
<tr>
<td>46</td>
<td>55.55</td>
<td>58.25</td>
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<td>No</td>
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<td>47</td>
<td>68.25</td>
<td>72.25</td>
<td>Poplar Creek</td>
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<td>No</td>
</tr>
<tr>
<td>48</td>
<td>47.20</td>
<td>47.25</td>
<td>Rock River</td>
<td>Small</td>
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</tr>
<tr>
<td>49</td>
<td>42.85</td>
<td>41.50</td>
<td>Poplar Creek</td>
<td>Small</td>
<td>Yes</td>
</tr>
</tbody>
</table>

2824.30   2877.25 – A test of these two scores is described below in #3.

Total LI Values for Survey Weights = 2824.30
Mean LI Value for Survey Weights (49 Respondents) = 2824.30/49 = 57.64
Total LI Values for Literature Review Weights = 2877.25
Mean LI Value for Literature Review Weights (49 Respondents) = 2877.25/49 = 58.72

3. Legitimacy Index Comparisons

LI Values using Survey Response Weights versus LI Values using Literature Review Weights: Mann-Whitney U Test

Is there a statistically significant difference between the LI values for literature review weights versus the LI values calculated with survey response weights? I could try to use the mean values for the two weighting systems (57.64 and 58.72) shown above and do a simple t-test,
but as described earlier these are ordinal data and a comparison of means would be inappropriate. Nor can I assume the normality of the data, which is another reason I cannot do a t-test. For this reason, a Mann-Whitney U test, a nonparametric version of the t-test is preferable. This test ranks all the LI values for literature review weights and survey response weights together, and then tests for differences in rankings between the two.

The Mann-Whitney U test and the similar Kruskal-Wallis test (used for rankings with more than 3 categories) are non-parametric tests that require far fewer assumptions about the distribution of data than parametric tests. One required assumption for a Mann-Whitney U or Kruskal-Wallis test is that the shape of the data distribution for the groups in question should be similar. In addition, all observations must be mutually independent. The latter assumption is met for this first test because the legitimacy rankings were derived from survey responses which were independent from one another. The assumption for similarly-shaped distributions can be determined by studying histograms for the two groups of data. As can be seen from the Histograms in Appendix E, the distribution shapes are roughly similar for both LI values using survey weights and literature review weights. Thus the Mann-Whitney U is an appropriate test for examining differences between the two weighting systems. For further Mann-Whitney U and Kruskal-Wallis tests conducted here, a similar comparison of data distribution shape was done by examining histograms for the different groups under investigation. A summary of the null and alternative hypotheses are seen below, as well as the results.

**Null Hypothesis:** There is no significant difference between the Legitimacy Index (LI) values based on survey weights versus the Legitimacy Index (LI) values based on literature review weights.
**Alternative Hypothesis:** There is a significant difference between the Legitimacy Index (LI) values based on survey weights versus the Legitimacy Index (LI) values based on the literature review weights.

**Results:** A Mann-Whitney U test was calculated comparing the ranks of legitimacy index values (LI) using the two different weighting methods: survey-based and literature review. The average rank for survey-based weighted LI values was 47.11, and the average rank for literature review weights was 51.89. The calculated Mann-Whitney U was 1083.5 which was insignificant at the 0.10 level (p = 0.406). The SPSS output for this test can be seen in Appendix D. Given the respondents, I conclude from this test that there was no difference in perceived legitimacy between the two weighting systems used in this research.

I also used a correlation test to determine how closely correlated the two LI measures were across the survey respondents. The Spearman Rank Correlation was chosen because it deals with ordinal data, whereas the Pearson product-moment correlation coefficient requires interval or ratio data. The Likert data used to calculate the Legitimacy Index values were ordinal, so the LI values must be considered ordinal data as well. I fully expected a close correlation between the two legitimacy index values for the survey respondents. Therefore, I used a one-tail test. The hypotheses and results for this test run are shown below. The SPSS output tables can be seen in Appendix D.

**Null Hypothesis:** There is no significant positive correlation between the Legitimacy Index (LI) using Survey weights versus the Legitimacy Index (LI) using the literature review weights.
**Alternative Hypothesis:** There is a significant positive relationship between the Legitimacy Index (LI) using survey weights versus the Legitimacy Index (LI) values using the literature review weights.

**Results:** A Spearman Rho correlation coefficient was calculated between the two LI measures. An examination of the Spearman Rho below shows that there is a very strong positive correlation (Rho = .906) between the two Legitimacy Indices (LI). This correlation is significant at the 0.01 level. The SPSS output for this test can be seen in Appendix D.

**Legitimacy Index Comparison – LI Values for the Three Watersheds: Kruskal-Wallis- (The test statistic for Kruskall-Wallis is called H, although SPSS labels it Chi-Square because of its distribution, rather than H, according to “Discovering Statistics Using SPSS” – by Andy Field) H Test**

I grouped the calculated LI values shown above by watershed, and then calculated an average LI value for each watershed. I did this for each of the two weighting methods (six total averages). Below (Table 6.2) are the results of those calculations in tabular form.

**Table 6.2 - Average LI Values for Each of the Three Watersheds**

<table>
<thead>
<tr>
<th>Watershed</th>
<th>LI-Survey-Response</th>
<th>LI-Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock</td>
<td>56.93</td>
<td>56.83</td>
</tr>
<tr>
<td>SE Fox</td>
<td>61.04</td>
<td>62.23</td>
</tr>
<tr>
<td>Popular Creek</td>
<td>56.36</td>
<td>58.68</td>
</tr>
</tbody>
</table>

As can be seen in this table, the average LI value for SE Fox was higher than the other two watersheds for both survey weights (61.04) and literature review weights (62.23). I
conducted a statistical test to see if this difference was significant. Again, because these mean values were derived from ordinal data, I needed to use a nonparametric test of comparison. The Kruskal-Wallis H test is similar to Mann-Whitney U except it can be used for three or more categories. Because I was looking at three different watersheds I used this test. Like the Mann Whitney U test, it ranks all the LI values and then determines if there is a significant difference in rankings for the three watersheds. The Kruskal-Wallis H can be used if it meets the same non-parametric assumptions mentioned earlier, independent samples and similarly distributed data.

As can be seen from the histograms in Appendix E, the distribution shapes are roughly similar for the three watersheds. This applies to both sets of LI data. Thus the Kruskal-Wallis H can be used to test for differences in LI values based on the three watersheds. The first test below examined survey-weighted LI data and the next test looked at literature-weighted data.

**Null Hypothesis 1:** There is no significant difference among the three watersheds with regards to legitimacy, as measured by the legitimacy index (LI) using survey respondent weights.

**Alternative Hypothesis 1:** There is significant differences among the three watersheds for the legitimacy index (LI) using survey weights.

**Results:** The Kruskal-Wallis H statistic of 2.284 had a probability of 0.319, and was thus insignificant at the 0.10 level for the three watersheds for LI values using survey weights. The mean ranks of the SE Fox, Rock River, and Poplar Creek were 30.73, 23.50, and 23.17 respectively. Despite the higher value for SE Fox, the test was insignificant with a probability of 0.319. There is no difference between the three watersheds for survey-weighted LI values.
I conducted a similar Kruskal-Wallis test for LI values based on literature review weights, because SE Fox was higher than the other two watersheds for this metric as well (see Table 6.2 above). The Kruskal-Wallis H was similarly insignificant, as the hypotheses and results section below show. The SPSS output for this test can be seen in Appendix D.

**Null Hypothesis 1:** There is no significant difference between the three watersheds with regards to legitimacy, as measured by the legitimacy index (LI) using literature review weights.

**Alternative Hypothesis 1:** There is significant differences between the three watersheds for the legitimacy index (LI) using literature review weights.

**Results:** The Kruskal-Wallis H was insignificant for differences between the three watersheds regarding LI values using literature weights. Pairwise comparisons are required for tests with significant results to determine which group comparisons account for the difference, but in this case the results were insignificant and so comparisons were not needed. The mean ranks of the SE Fox, Rock River, and Poplar Creek were 30.82, 21.33, and 25.53 respectively. Despite the higher value for SE Fox, the test produced an H test statistic value of 3.173 which was insignificant at the 0.10 level for a two-tail test (probability = 0.205)

**Conclusions**

No significant differences were detected between the two LI weighting methods. The LI values from both weighting systems showed a strong positive correlation, as well. The biggest
difference exhibited in the tests above was seen in the last test for LI values using literature review weights, but this result was also insignificant. It must be remembered that the LI values calculated here are a metric of perceived legitimacy as determined by survey respondents, and so a higher value in SE Fox suggests these participants perceive their watershed activities as more legitimate than do the members of the other two watershed groups. A table of the results of the four statistical tests conducted on legitimacy index values can be seen below (Table 6.3).

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Statistical Test</th>
<th>Test Statistic Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LI - Survey Weights versus LI - Literature Review Weights</td>
<td>Comparison to see if a Difference Exists</td>
<td>Mann Whitney U</td>
<td>U = 1083.5</td>
<td>NS</td>
</tr>
<tr>
<td>LI Survey Weights versus Literature Review Weights</td>
<td>Comparison to see if a Correlation Exists</td>
<td>Spearman Rank</td>
<td>Spearman Rho = .906</td>
<td>*</td>
</tr>
<tr>
<td>Watershed (Rock, SE Fox, and Poplar Creek)</td>
<td>Legitimacy - LI Values - Survey Weights</td>
<td>Kruskal-Wallis</td>
<td>H = 2.284</td>
<td>NS</td>
</tr>
<tr>
<td>Watershed (Rock, SE Fox, and Poplar Creek)</td>
<td>Legitimacy - LI Values – Literature Review Weights</td>
<td>Kruskal-Wallis</td>
<td>H = 3.73</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Significant at the 0.10 Level  **Significant at the 0.05 Level  NS = Not Significant

(B) Scale: Statistical Test Results

Scale (3 Levels) versus Legitimacy Index (LI) – Weights Based on Survey Responses:

Kruskal-Wallis Test

Scale served as a categorical (small, medium, or large), independent variable that was compared to the dependent variable of legitimacy. Because the legitimacy index is derived from
ordinal data, a non-parametric test for ranked data was used. Just like the earlier test of LI on three different watersheds, the Kruskal-Wallis H test was selected because there were three different categories of scale. The Kruskal-Wallis test was used to test for significant differences between small, medium, and large scale watersheds regarding the legitimacy index. Small scale refers to participants working in groups where the primary waterway targeted is HUC 12 or smaller (15 to 62 square miles) according to the USGS. Medium scale participants work in watersheds that match HUC 10 (62 to 390 square miles). Large scale respondents work in watersheds larger than HUC 8 (over 700 square miles). The data distribution of LI values (survey weights) is similar for all three scales, as the histograms in Appendix E show, and thus the limited nonparametric assumptions for Kruskal-Wallis H test are met here.

**Null Hypothesis 1:** There is no significant difference between small, medium, and large scale watersheds with regards to legitimacy, as measured by the legitimacy index (LI) using survey respondent weights.

**Alternative Hypothesis 1:** There are significant differences between the three watershed scales for the legitimacy index, with smaller scales having a larger legitimacy index than larger scales, as indicated by literature review. Thus, a one-tailed test will be used.

**Results:** The Kruskal-Wallis H statistic comparing the three scales versus legitimacy index values (survey weighs) produced results which were not significant at the 0.10 level. The H statistic was 0.763, and has a Chi-Square distribution exhibiting a p-value of 0.683. Consequently, the null hypothesis was retained while the alternative hypothesis was rejected.
SPPS generated table for these results can be seen in Appendix D. It appears from this test that scale has no effect on index of perceived legitimacy (survey respondent weighs).

Scale (2 Levels) versus Legitimacy Index (LI) – Weights Based on Survey Responses: Mann Whitney U

I conducted a Mann Whitney U test to see if there was a significant relationship between two levels of scale and the Legitimacy Index, again using the index based on survey respondent weights. Mann-Whitney U is applicable in this case, because there are only two categories of scale that were compared to the ranks of LI values. I reduced the data from three sizes of watersheds by putting medium and large scale watersheds together and labeling them large scale. The small scale watersheds were in the other category and were still called small scale (received a 1 category label). There were 26 small scale watersheds and 23 large scale watersheds (formerly there were 14 medium and 9 large scale watersheds in the three scale dataset) using this division. Below are the hypotheses and results for this Mann-Whitney U test.

Null Hypothesis: There is no significant difference between the two categories of scale (small and large) regarding the legitimacy index (with survey weights).

Alternative Hypothesis: Larger scale watershed groups will exhibit significantly smaller legitimacy index values (survey weights) than smaller scale groups.
Results: A Mann-Whitney U test was conducted to examine the difference in legitimacy index values for small and large scale watershed groups. The data distributions for the two scales were similar enough to allow this test to proceed. The histogram of these data distributions can be seen in Appendix E. The histograms of all further Mann Whitney and Kruskal-Wallis tests can also be seen in Appendix E.

The Mann-Whitney U statistic value was 0.2055 and insignificant at the 0.10 level. I used a one-tail test because previous literature suggested that smaller scale watersheds are better for achieving legitimacy. The null hypothesis is accepted and the alternative or test hypothesis is rejected. An SPSS generated table of results can be seen for this test in Appendix D.

Scale (3 Levels) versus Legitimacy Index (LI) – Weights Based on the Literature Review: Kruskal-Wallis Test

I conducted another Kruskal-Wallis test on differences between the legitimacy index values for the three scales, but this time I used the legitimacy index based on literature review weights.

Null Hypothesis: There is no significant difference between the three categories of scale (small and large) regarding the legitimacy index (LI) using literature review weights.

Alternative Hypothesis: Larger scale watershed groups will exhibit significantly smaller legitimacy index values (LI) using literature review weights than smaller scale groups.
**Results:** Running the Kruskal-Wallis test comparing three scales versus LI values based on literature review weights also yielded insignificant results. As noted in the table in Appendix D, the null hypothesis was retained and the alternative hypothesis was rejected due to an H value of 0.855 which is insignificant at the 0.10 level. Based on this test, there appears to be no significant relationship between legitimacy index values (literature review weights) and scale.

**Scale (2 Levels) versus Legitimacy Index (LI) – Weights Based on the Literature Review:**

**Mann-Whitney U Test**

I ran another test of scale effects for LI values based on literature review weights, but this time I used a two-scale grouping rather than the three-scale grouping. Because there were only two categories used to compare ranks, the Mann-Whitney-U Test was applicable. The hypotheses and results for this test of scale based on two categories are shown below.

**Null Hypothesis:** There is no significant difference between the three categories of scale (small and large) regarding the legitimacy index (with literature review weights).

**Alternative Hypothesis:** Larger scale watershed groups will exhibit significantly smaller legitimacy index values (literature review weights) than smaller scale groups.

**Results:** A Mann-Whitney U Test was used to examine the difference in the legitimacy of small versus large scale watershed organizations. The U statistic of 279.5 was insignificant at the 0.10
level for a one-tailed test. The null hypothesis is therefore accepted, and thus the alternative hypothesis is rejected.

**Scale (2 Levels) versus Local Knowledge (2 Levels): Chi-Square Test**

Some prior research into scale effects on watershed groups found that smaller scale groups rely more on local knowledge (as opposed to scientific experts) than groups operating over a larger scale. One question on the survey asked the respondents to rate their preference for local knowledge (often analyzed in comparison to scientific knowledge). Due to the literature review, it was expected that respondents in the smaller-scale watersheds should prefer local knowledge to a significantly greater extent than those in larger-scale basins. The answers from the question (Likert data) on local knowledge served as the dependent variable (ordinal data). I used a Chi-Square test to see if local knowledge priorities were evenly spread throughout the three scales of watersheds, or if local knowledge received a Likert-scale ranking in the smaller scale watersheds. I divided the results of the Local Knowledge question into two categories for use in the Chi-Square test. The question from the survey was worded as follows, “Local knowledge and preferences should ultimately prevail even when they conflict with the judgment of scientific experts.” This question was borrowed from an earlier study by Wieble, Sabatier, and Lubbel (2004), because I felt it was a good one to ask of my survey volunteers. The respondents selected one of 7 options of agreement: “strongly agree”, “mostly agree”, “slightly agree”, “neither agree nor disagree,” “slightly disagree,” “mostly disagree,” or “strongly disagree.” These responses were reduced to three 2 ordinal categories for analysis. Those saying they strongly, mostly, or slightly agreed that local knowledge should trump scientific knowledge were
placed into a category representing the highest level of focus on local knowledge. Those who selected “neither agree nor disagree”, “slightly disagree”, “mostly disagree” or “strongly disagree” were grouped into a second category representing a lower level of agreement with use of local knowledge, as opposed to scientific expertise.

I rejected a three by three, and a two by three, comparison of categories (three levels of scale and/or three levels of local knowledge) because each of those tests resulted an expected cell-count of less than five, invalidating the Chi-Square test. Instead, I chose a two by two comparison of categories, with two levels of scale and two levels of local knowledge. Scale was grouped into two categories in much the same way that the local-knowledge results were grouped. This loss of data for scale was necessary in order to run a valid Chi-Square test. Respondents working in small scale watersheds were grouped into one category, and those from medium and large scale watersheds were grouped into another category, just as with my previous test. The two groups were then compared statistically.

**Null Hypothesis:** There is no significant difference between the two scales regarding the focus on local knowledge

**Alternative Hypothesis:** Smaller scale watersheds will exhibit a significantly larger degree of concern for local knowledge than larger scales.

**Results:** The significance value for a one-tailed Chi-Square test was 0.117, and it was very close to being insignificant at the 0.10 level. No significant relationship was found between the two variables of scale and local knowledge (df = 1) based on a chi-square value of 0.117, but the
probability of chance causing this difference is still low enough to declare this topic to be a good topic for future research. The chi-square contingency table for this test can be seen in Appendix D.

**Scale (3 Levels) versus Local Knowledge (3 Levels): Spearman Rank Correlation**

I also used the Spearman-Rank Correlation to test for possible correlations between scale and local knowledge. Unlike the Chi-Square test above, I grouped the Likert responses for local knowledge into three categories: high, medium, and low. Scale was again the independent variable and local knowledge the dependent variable. I used the data in the file “Three-Scale” as the independent variable rather than grouping them into two categories, which was necessary for the previous Chi-Square test. For this test, I could keep my original data and code each watershed scale differently for comparison. In a Spearman-Rank test the data must be in ordinal form, which is the data type for both the scale categories and the Likert questions on the local knowledge question. Based on the literature review, there was an expectation that a negative relationship would exist between scale and local knowledge, meaning that as the scale got larger local knowledge would be less preferred. The hypotheses and results tests are shown below.

**Null Hypothesis:** There is no significant relationship between the scale of the watershed and the focus on local knowledge.

**Alternative Hypothesis:** Smaller scale watershed groups will exhibit a greater concern for local knowledge than larger scale watershed groups. Thus, there will be a significant negative relationship between scale and local knowledge.
Results: A Spearman rho correlation was calculated for the relationship between scale (3 levels) and local knowledge (ranked Likert data). Looking at the results (see Appendix D – Scale Test 6) there is a negative relationship, with a Spearman Rho value of -0.218 exhibiting a significance value of 0.066, which is significant at the 0.10 level. Therefore, we reject the null hypothesis and accept the test hypothesis. There is a significant correlation between scale and local knowledge, based on this Spearman Rank correlation test. The test results here, along with a barely insignificant result (0.117 versus 9.10) for the previous Chi-Square test, leads me to conclude that scale does have an impact on use of local knowledge, with smaller scale watershed participants (respondents) placing a higher value on local knowledge than larger scale participants, as was the case with much of the literature review.

Scale (3 Levels) versus Issues Outside of the Watershed: Spearman Rank Correlation

One of the questions in the survey asked respondents if issues outside of the watershed should be addressed by their particular partnership. This is good topic for study because watershed problems are complex, interrelated issues that are highly dependent on scale, and many activities within a given watershed often negatively impact areas outside of the basin. In addition to finding out if survey respondents are aware of these inter-basin connections, I wanted to see if scale affects their attitudes regarding the need to solve inter-basin problems. For this reason, I compared survey responses on this question to the scale of that person’s watershed group.

A Spearman Rank Correlation test was used to examine the relationship between the three categories of scale; small, medium, or large; and the desire to deal with impacts occurring
outside of the watershed. Chi Square expected frequencies should be greater than five, with loss of power occurring as that number decreases (Field 2005). Due to the small number of values in each of the seven categories (possible Likert responses) of concern for impacts outside the watershed, a Chi-Square test was rejected for this comparison. However, a Chi-Square test using three categories of concern for issues outside of the watershed (higher N values in each category) was attempted and is described below. A Likert question from the survey provided the data for the variable representing concern for impacts outside of the watershed and read as follows, “My watershed organization should consider impacts that may occur outside of the watershed, not just downstream, but in adjacent basins as well.” The Likert values ranged from 1 (strongly agree) to 7 (strongly disagree), but for purposes of the statistical test I reversed all the numbers so that the highest level of agreement (strongly agree) was given a 7 and the lowest level of agreement (strongly disagree) was given a value of 1. I did this so that higher values represented a higher concern for impacts outside of the watershed.

The hypothesis here is opposite of that for local knowledge, because I expected those respondents working in larger basins to be more concerned with impacts outside of the boundary of their watershed (both downstream and in neighboring watersheds) than people in smaller-scale groups. Thus, I was expecting a strong, positive correlation between larger, watershed-scale organizations and the desire to attack impacts that may occur outside of the watershed. The hypotheses and results for this test are shown below.

**Null Hypothesis:** There is no significant relationship between the size of the scale and the concern for impacts outside the watershed
**Alternative Hypothesis:** Larger-scale watershed groups will exhibit a greater positive concern for impacts outside of the watershed than smaller-scale watershed groups

**Results:** A Spearman rho correlation was calculated for the relationship between scale and concern for impacts outside of the watershed. A negative rho correlation of -0.066 exhibited a significance value of 0.326 which is insignificant at the 0.10 level. The SPPS results table for this test can be seen in Appendix D. I conclude from these results that concern for impacts outside of the watershed and scale are not related. The next section will look at this relationship using a Chi-Square test, but with three categories instead of seven for levels of concern for impacts outside of the watershed, and two levels of scale instead of three in order to increase the N size per cell for each variable.

**Scale (2 Levels) versus Issues outside the Watershed (3 Levels): Chi-Square Test**

Another test involved a Chi-Square analysis of different frequencies for the three different scales and the perceived need to address issues outside of the watershed. In other words, will more people in the larger scale watersheds express stronger preferences for dealing with issues outside of the watershed? In order to do this test, I took the ordinal Likert data (1-7) for the following question and reduced it to nominal or categorical data; “My watershed should consider impacts that may occur outside of the watershed, not just downstream, but in adjacent basins as well.” I did this by grouping responses into one of three categories. Responses 6 and 7 (strongly disagree and mostly disagree) went into category 1 (lowest level of concern for outside impacts), responses 4, 5, and 6 (slightly disagree, neither agree nor disagree, and slightly
agree) were put into category 2 (moderate concern for outside impacts), and responses 1 and 2
(strongly agree and mostly agree) were placed into category 3 (strong level of concern for
outside impacts). These groupings are admittedly somewhat arbitrary, but make sense when you
consider I am dealing with ordinal data. So, the two highest categories were put into the highest
category, and the two lowest put into the lowest category. That left the three categories in the
middle category. I again reversed the numbering so the greatest degree of agreement with the
questions was represented by the highest numbered category.

The two different scales (small and large – with medium merged into small) made up the
categorical, independent variable. This was compared to the three levels of concern for issues
outside of the watershed, which was the categorical, dependent variable. I eventually merged the
three categories for this variable into two, as no respondents chose the lowest level of concern
for issues outside of the watershed. Thus, I had a two-by-two Chi-Square test of categories. The
hypotheses and results follow.

**Null Hypothesis:** There is no significant difference in levels of concern for impacts outside of
the watershed based on the size of the watershed scale

**Alternative Hypothesis:** Participants from larger watershed scale efforts will exhibit a greater
concern for impacts outside of the watershed.

**Results:** A chi-square test of independence was calculated comparing two levels of concern for
issues outside of the watershed versus two scales of watershed efforts. The Pearson Chi-Square
statistic of 0.007 had a probability of 0.934 which was insignificant at the 0.10 confidence level.
I therefore accept the null hypothesis and reject the alternative hypothesis. There is no relationship between scale and concern for issues outside of the watershed. The SPSS output for this test is shown in Appendix D. However, respondents in all scales appeared to have a high concern for impacts outside of the watershed. In a later section I will discuss the survey responses to individual questions on this subject, and the overall strong commitment participants showed for issues outside of the watershed will be described then.

**Conclusions: Impact of Scale on Perceived Legitimacy (LI) and Other Variables**

Scale had no bearing on the overall perceived legitimacy of respondents as measured by the legitimacy index values. This was true for perceived legitimacy using LI values based on both the survey and literature review weighting systems. Also, the statistical tests done here showed no relationship between scale and concern for impacts outside of the watershed. This is a positive result because respondents from small, medium, and large scale watershed groups all seemed to be cognizant of the need to deal with critical issues and problems that occur outside of the watershed, including ones occurring downstream. This will be discussed later in my discussion on the individual survey questions.

However, scale did affect the desire to rely on local knowledge, as evidenced by a barely insignificant Chi-Square test (p-value 0.117 vs. a 0.10 confidence level) and a significant Spearman Rank correlation. As expected, the respondents from smaller scale groups placed a higher value on local knowledge than the respondents who participated in larger- scale groups. For this reason, further investigation might focus on whether larger- scale basin groups have a tendency to dismiss local knowledge. If so, this is a possible threat to the legitimacy of these
collaborations, and further research into this area may be needed. A summary table (Table 6.4) of the results of my statistical tests on scale is shown below.

### Table 6.4 - Scale vs. Legitimacy and Other Variables

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable or Test</th>
<th>Statistical Test</th>
<th>Test Statistic Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale – 3 Levels</td>
<td>LI-Survey Weights</td>
<td>Kruskal-Wallis</td>
<td>H = 0.763</td>
<td>NS</td>
</tr>
<tr>
<td>Scale – 2 Levels</td>
<td>LI-Survey Weights</td>
<td>Mann-Whitney U</td>
<td>U = 0.2055</td>
<td>NS</td>
</tr>
<tr>
<td>Scale – 3 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Kruskal-Wallis</td>
<td>H = 0.855</td>
<td>NS</td>
</tr>
<tr>
<td>Scale – 2 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Mann-Whitney U</td>
<td>U = 279.5</td>
<td>NS</td>
</tr>
<tr>
<td>Scale – 2 Levels</td>
<td>Local Knowledge – 2 Levels</td>
<td>Chi-Square</td>
<td>Chi-Square = 0.117</td>
<td>NS</td>
</tr>
<tr>
<td>Scale – 3 Levels</td>
<td>Local Knowledge – Ranked Data</td>
<td>Spearman Rank</td>
<td>Rho = -0.218</td>
<td>*</td>
</tr>
<tr>
<td>Scale – 3 Levels</td>
<td>Concern for Impacts Outside Watershed</td>
<td>Spearman Rank</td>
<td>Rho = -0.066</td>
<td>NS</td>
</tr>
<tr>
<td>Scale – 2 Levels</td>
<td>Concern for Impacts Outside Watershed</td>
<td>Chi-Square</td>
<td>Chi Square = 0.007</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Significant at the 0.10 Level
** Significant at the 0.05 Level
NS = Not Significant

What about the possibility that smaller, local groups may be rejecting scientific expertise in favor of local knowledge? In the watersheds studied in this research project, there was a great deal of capacity building from scientific experts associated with larger-scale, umbrella groups (Fox River Ecosystem Partnership (FREP) and the Chicago Metropolitan Agency for Planning (CMAP) in Illinois, UW Extension and Department of Natural Resources (DNR) in Wisconsin), and this did not appear to be a threat to the legitimacy of the watershed collaborative process.
As described in the literature search in chapter 2, there was a great deal of debate about the role of consensus in determining legitimacy in natural resource collaborations. Unlike the other elements of legitimacy, there was a lack of general agreement about the need for consensus in order to achieve legitimacy. In addition, some authors believe that striving for consensus-based decisions in watershed management can be counterproductive because it often leads to diluted outcomes and the co-optation of environmental interests by economic powers. For these reasons, my research will attempt to answer two general questions: “How important is consensus in watershed planning?” and “How do consensus-based planning models affect legitimacy, either positively or negatively?”

Survey respondents were asked to categorize their watershed groups into one of three decision-making models: consensus-based, democratic/voting-based, or hierarchical. If they chose consensus they were then linked to another question that asks them to rate their group’s focus on consensus using a 4 point scale (1 = Very Strong Need for Consensus, 2 = Strong Need for Consensus, 3 = Moderate Need for Consensus, 4 = Slight Preference for Consensus). The question on consensus read as follows, “Choose the statement below that best describes your watershed group” and the options were: (1) “a democratically driven group run via a participatory voting process,” (2) “an organized hierarchy with a strong central leader and a clear direction,” or (3) “a consensus-based group whereby agreement is required by all participants.” Respondents selected consensus-driven or one of the other two models of decision-making. The consensus model of decision-making was chosen by 22 of the 49 people who answered this question.
The 27 people who chose a method of decision-making other than consensus were skipped around the next set of questions in the survey, which dealt specifically with consensus. The 22 people who did chose consensus were directed to these questions regarding consensus, and the first question asked them to rank order their group’s focus on consensus as described above.

My first test on consensus compared respondents with varying degrees of consensus in their watershed groups. For the non-consensus groups of respondents I assigned a categorical value of 0. The lowest level of consensus for those who did use this mode of decision-making (“slight preference for consensus”) was given a categorical value of 1. The next lowest level (“moderate need for consensus”) was given a value of 2, and second highest of level of focus on consensus (strong need for consensus) was assigned a categorical value of 3. Finally, the highest degree of consensus (very strong need for consensus) was given a categorical value of 4. I now had five levels of consensus that were assigned categorical values as follows: 0 = non-consensus, 1 = slight preference for consensus, 2 = moderate need for consensus, 3 = strong need for consensus, 4 = very strong for consensus.

The nonparametric Kruskal-Wallis H test was used because the independent variable (consensus) is categorical and the dependent variable (legitimacy index) is ordinal (Likert). The parametric test of choice is the Kruskal-Wallis H test because it can handle the several categories of consensus (very strong, strong, moderately strong, and slight), whereas other ranked data-tests like Mann-Whitney U and Wilcox only work with two categories.

The second test investigated the impact of consensus on legitimacy by comparing only two different groups, those who used consensus in their group's decision-making model versus those that used one of the other two methods (democratic or hierarchical). In this case, the
independent variable was broken down into two dichotomous variables (consensus versus non-consensus decision-making models), and so the Mann-Whitney U test was used instead of Kruskal-Wallis H.

In addition, a Spearman Rank Correlation was run to see if the variables consensus and legitimacy co-vary. Because the data are non-parametric, the Spearman Rank Correlation was used instead of the Pearson Correlation for interval or ratio data.

**Consensus (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test**

The first test for consensus compared the 5 levels of consensus (non-consensus, slight preference for consensus, moderate need for consensus, strong need for consensus, and very strong need for consensus) with the overall legitimacy index using weights determined by the survey respondents. The five levels of consensus represented the categorical and ordinal (ranked) independent variable, and the legitimacy index values represented the ordinal, dependent variable. Because no survey respondents picked the low value for consensus (1), there were in fact only 4 levels of consensus to be tested. The Kruskal-Wallis test was run on these variables using the following hypotheses.

**Null Hypothesis:** There is no significant difference between the four levels of consensus regarding the legitimacy index (survey weights).
**Alternative Hypothesis:** Legitimacy index values will be lower for those respondents who were in groups where consensus was heavily emphasized, as seen in the literature. A one-tailed test was used, therefore.

**Results:** A Kruskal-Wallis H statistic was calculated comparing the four levels of consensus levels chosen and the legitimacy index values using survey-based weights. Given the exploratory nature of the research the 0.10 level of significance was used. A significant relationship was found \( (H = 7.364, p = 0.061 < 0.10) \) between the two variables of consensus and legitimacy (survey weights). The p-value of 0.061 is significant at the 0.10 confidence level leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis.

If a Kruskall-Wallis test is significant, it is necessary to do a pair-wise comparison of the different groups (four levels of consensus) to see where the differences are the significant. The pairwise comparisons were done using Mann-Whitney U tests, which are described below. The SPSS output for this Kruskal-Wallis can be seen in Appendix D. It should be noted, however, that while a significant relationship was found between consensus and perceived legitimacy (LI values) the lowest mean LI ranks were not found in the high consensus groups as expected. The mean rank of LI for the non-consensus group was high at 27.91, as expected, but the mean LI ranks were even higher for the HIGHEST consensus group (Group 4, or Very Strong Need for Consensus). The lowest LI ranks (mean rank of 11.00) were found in the second level of consensus, so there did not seem to be a consistent pattern of higher mean LI ranks associated with lower consensus values. The mean LI ranks for the four consensus groups are as follows: (1) non-consensus = mean rank of 27.91, (2) moderate need for consensus (remember, nobody
selected slight need for consensus) = mean rank of 11.00, (3) strong need for consensus = mean rank of 23.68, and (4) very strong need for consensus = mean rank of 29.00.

**Pairwise Comparisons of the 4 Levels of Consensus and Legitimacy Index Values (Survey Weights): Mann-Whitney U Test**

There were initially five ordered categories of consensus which were as follows; (0) non-consensus, (1) slight preference for consensus, (2) moderate need for consensus, (3) strong need for consensus, and (4) very strong need for consensus. None of the survey respondents chose slight need for consensus (1), so these five categories were reduced down to four. There were six pair-wise Mann-Whitney U comparisons done for the foru remaining categories as shown below.

1. Non-Consensus (0) versus Moderate Need for Consensus (2)
2. Non-Consensus (0) versus Strong Need for Consensus (3)
3. Non-Consensus (0) versus Very Strong Need for Consensus (4)
4. Moderate Need for Consensus (2) versus Strong Need for Consensus (3)
5. Moderate Need for Consensus (2) versus Very Strong Need for Consensus (4)
6. Strong Need for Consensus (3) versus Very Strong Need for Consensus (4)

In order to keep the level of significance at 0.10 for all comparisons, a Bonferroni correction was utilized by dividing 0.10 by the number of comparisons. Dividing 0.10 by 6 gives a value of 0.016. So, for each of our pair-wise comparisons we are looking for a p-value of less than 0.016 to be significant at the 0.10 level. A one-tail test for significance for all these
tests was generated because I had reason to believe from issues identified in the literature that consensus groups would exhibit less perceived legitimacy.

I have summarized the results of the Mann-Whitney comparisons in the chart (Table 6.5) immediately below. The Mann-Whitney U values are listed, along with the probability for a one-tailed test. The last column shows whether the test was significant at the 0.10 level (smaller than a significance value of 0.016 for the .10 level). All values and relationships that were significant are bolded. It can be seen from this chart below that the significant differences revolve around category 2, which was the “moderate need for consensus” category. It can also be seen in this chart that two comparisons were significant at the 0.10 level. These were the comparisons between categories moderate need for consensus versus non-consensus, and moderate need for consensus versus and strong need for consensus.

If we look at the SPSS output above for the original Kruskal-Wallis test, we see that moderate need for consensus had the lowest mean rank score at 11. This was well below the other categories which all had mean ranks scores in the 20’s. The significant differences between the four categories in the original Kruskal-Wallis test were almost entirely due to the low ranks in the moderate need category. By contrast, the two categories with stronger levels of consensus -- strong need for consensus (category 3) and very strong need for consensus (category 4) -- both had similarly high ranks for legitimacy, and thus exhibited very little difference between them. The SPSS output for these pair-wise comparisons can be seen in Appendix D, but a summary of the pair-wise comparisons is shown below in Table 6.5.

So, while the very low mean LI rank for the moderate need for consensus category is the main reason why the Kruskal-Wallis test was significant, there does not appear to be a negative relationship between consensus and perceived legitimacy, as was expected. In fact, as described
above, the highest LI mean ranks were found in both the non-consensus group (mean LI rank of 27.91) and in the highest consensus category (very strong need for consensus = mean rank of 29.00). Thus, consensus does not appear to impede perceived legitimacy, as initially expected.

Table 6.5 - Pair-Wise Comparisons of Consensus Categories Using Mann-Whitney U

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Mann-Whitney U</th>
<th>1-Tailed P</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non vs. Moderate</td>
<td>31.0</td>
<td>.009</td>
<td>*</td>
</tr>
<tr>
<td>Non vs. Strong</td>
<td>116.0</td>
<td>.154</td>
<td>NS</td>
</tr>
<tr>
<td>Non vs. Very Strong</td>
<td>64.0</td>
<td>.440</td>
<td>NS</td>
</tr>
<tr>
<td>Moderate vs. Strong</td>
<td>10.0</td>
<td>.010</td>
<td>*</td>
</tr>
<tr>
<td>Moderate vs. Very Strong</td>
<td>4.0</td>
<td>.026</td>
<td>NS</td>
</tr>
<tr>
<td>Strong vs. Very Strong</td>
<td>22.0</td>
<td>.2915</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Significant at the 0.10 Level  **Significant at the 0.05 Level  NS = Not Significant

Consensus (4 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test

The next test for consensus compared the four levels of consensus with the second legitimacy index, the one using weights determined by the literature review (my interpretation of it). Again, the five initial levels were reduced to four categories because no respondents chose the lowest level of need for consensus (level 1). The four levels of consensus represented the categorical, independent variable, and the legitimacy index values represented the ordinal, dependent variable. The Kruskal-Wallis test was run on these variables using the following hypotheses.
**Null Hypothesis:** There is no significant difference between the five levels of consensus regarding the legitimacy index based on literature review weights.

**Alternative Hypothesis:** Lower levels of consensus will exhibit significantly larger legitimacy index values, based on literature review weights, than groups where consensus was heavily emphasized.

**Results:** A Kruskal-Wallis test was calculated comparing the four levels of consensus levels and the legitimacy index values based on literature review weights. No significant relationship was found ($H = 4.743, p = 0.192 > .10$) between the two variables. Consequently, I accept the null hypothesis and reject the alternative hypothesis. However, this probability value was close enough to the significance value of 0.10 to warrant further investigation of the relationship between consensus and legitimacy. The SPSS output for the Kruskall-Wallis test of consensus and LI values (literature review weights) is shown in Appendix D. Still, this test and the one using LI based on survey weights did not exhibit the type of negative relationship with consensus that I originally expected, based on the literature.

**Consensus (2 Levels – yes or no) versus Legitimacy Index (Survey Weights): Mann Whitney U Test**

For this test, I simply compared the legitimacy index values for those people in consensus-based watershed groups versus those in the other two non-consensus groups (hierarchical or democratic). I am leaving out the degree of consensus for those within these
consensus-groups, and simply looking at those who identified consensus as their group’s model versus those who identified one of the other two modes of decision-making. The two levels of consensus (yes or no) represented the categorical, independent variable, and the legitimacy index values (survey-based weights) represented the ordinal, dependent variable. A Mann-Whitney U test was used because there were only two categorical, independent variables. The test was run using the following hypotheses.

**Null Hypothesis:** There is no significant difference between the two categories of consensus (yes or no) regarding the legitimacy index (based on survey weights).

**Alternative Hypothesis:** The non-consensus category will exhibit significantly larger legitimacy index values, based on literature review weights, than the consensus group.

**Results:** A Mann-Whitney U test was conducted to examine the difference in legitimacy index values for consensus and non-consensus based watershed groups. The test yielded a Mann-Whitney U value of 218.5 based on N values of 27 and 22, and 47 degrees of freedom. A Mann-Whitney U value of 218.5 equates to a probability of 0.115. The probability for a 1-tail test is divided by two to get a one-tailed probability of 0.0575. Again, the value of 0.10 was used as the cutoff due to the exploratory nature of this research, and because 0.0575 < 0.10 the null hypothesis is rejected and the test or alternative hypothesis is accepted. The SPSS output tables for this test can be seen in Appendix D.
Consensus (2 Levels – yes or no) versus Legitimacy Index (Literature Weights): Mann Whitney U Test

A second test was conducted comparing the two levels of consensus (yes or no), but this time I used the legitimacy index as calculated using the literature review weights. The two levels of consensus (yes or no) represented the categorical, independent variable and the legitimacy index values (literature review weights) represented the ordinal, dependent variable. Again, a Mann-Whitney U test was used because there were only two categorical, independent variables. The test was run using the following hypotheses.

**Null Hypothesis:** There is no significant difference between the two categories of consensus (yes or no) regarding the legitimacy index based on literature review weights.

**Alternative Hypothesis:** The non-consensus category will exhibit significantly larger legitimacy index values, based on literature review weights, than the consensus group.

**Results:** A Mann-Whitney U test was conducted to examine the difference in legitimacy index values using literature review weights for consensus and non-consensus based watershed groups. The Mann Whitney U test yielded a U Value of 244 and a probability of 0.287 based on 47 degrees of freedom (N = 27 and N = 22) as seen in the SPPS output tables below. The Mann Whitney Value was 244 which produced a one-tailed probability of 0.1435, which is insignificant at the 0.10 level. While the results are statistically insignificant, from a substantive perspective they support the literature and indicate a possible relationship that should be evaluated in future
research. The two tests of consensus versus legitimacy (using both weighting systems) indicate a reason for additional research on consensus, as far as its impact on the legitimacy of watershed groups. The SPSS output for this test can be seen in Appendix D.

**Spearman Rank Correlation – 4 Levels of Consensus vs. LI – Survey Weights**

I also conducted a correlation using the non-parametric Spearman Rank correlation. Even though I used this test sparingly due to the problem of multiple ties (with only 7 Likert options, numerous ties become inevitable), I decided to use it to detect a possible correlation between legitimacy index values (using survey weights) and consensus. Below are the hypotheses and results of this test. Another was conducted using literature review weights instead of survey weights, and those results are discussed below.

**Null Hypothesis:** There is no significant correlation between consensus (4 Categories) and perceived legitimacy (LI – Survey Weights).

**Alternative Hypothesis:** Consensus-based groups will exhibit a significant negative correlation with perceived legitimacy (LI with Survey weights).

**Results:** A Spearman Rank Correlation was done between 4 levels of Consensus and Legitimacy Index using Survey Weights. The Spearman Rho correlation was -0.123 and its significance level was 0.200. This is below my cutoff of 0.10. Thus, this correlation test was insignificant. I accept the null hypothesis and reject the alternative hypothesis.
Spearman Rank Correlation – 4 Levels of Consensus vs. LI – Literature Review Weights

**Null Hypothesis:** There is no significant correlation between consensus (4 Categories) and perceived legitimacy (LI – Literature Review Weights).

**Alternative Hypothesis:** Consensus-based groups will exhibit a significant negative correlation with perceived legitimacy (LI – Literature Review Weights).

**Results:** A Spearman Rank Correlation was done between 4 levels of Consensus and Legitimacy Index using literature review weights. The Spearman Rho correlation was -0.063 and its significance level was 0.333. Thus, this correlation was insignificant. I accept the null hypothesis and reject the alternative hypothesis. The SPSS output for both Spearman Correlation tests (5 and 6) can be seen in Appendix D.

**Conclusions: Relationship between Consensus and Perceived Legitimacy (LI)**

The results above were mixed but lead me to conclude a possible negative relationship may exist between perceived legitimacy and consensus, thus justifying further research. The link between consensus and perceived legitimacy was stronger for LI values using survey weights than literature review weights. The two Mann-Whitney U tests for LI using survey weights (non-consensus versus consensus, and four levels of consensus) were both significant at the 0.10 level. In addition, two of the tests for LI using literature review weights (consensus versus non-consensus, and four levels of consensus) were insignificant, but just barely (0.1435 and 0.192).
For the test of LI using survey weights, a pair-wise set of Mann-Whitney U tests were done on the four levels of consensus to determine where the differences were most significant. Most of the significant results from the original test were solely due to the extremely low legitimacy values in just one consensus category (category two – moderate need for consensus). Also, the two Spearman Rank Correlations for both survey and literature review weights were insignificant.

Nevertheless, I conclude that there could be a significant relationship between consensus and legitimacy for the watersheds studied here, with higher legitimacy values possibly associated with the non-consensus individuals (higher rankings for non-consensus – see Appendix D). However, each individual’s perception of consensus may vary quite a bit, leading to an underestimation or overestimation of the true role of consensus for each watershed group. At the least, further research is warranted to investigate this possible relationship consensus and perceived legitimacy. The Spearman Rank tests were insignificant, but they suffer from the problem of multiple ties, and I attach less importance to their results than those for the Mann-Whitney U and Kruskal-Wallis tests. In this case, consensus seems to be a possible negative factor for the legitimacy of watershed collaborations, based on the perceptions of their participants. Other potential negative relationships were also tested and are described in the next few sections.

Tests 7-10 - The Impact of Consensus on Four Factors of Legitimacy: (1) Concerns for Impacts Outside of the Watershed, (2) Addressing All Important Issues, (3) Local Environmental Concerns, and (4) National Environmental Issues
Earlier tests indicate a possible negative relationship between consensus and the perceived legitimacy of respondents (LI values). In addition, I investigated the potential negative impacts consensus could have on four other legitimacy-related factors: concern for impacts outside of the watershed, addressing all critical issues, dealing with contentious local concerns, and inclusion of environmental issues. These four issues were addressed in separate survey questions (see Appendix B). These questions were added to the survey based on a literature review that found that a focus on consensus often causes participants to ignore broader, regional issues that transcend watershed boundaries, or issues that are seen as contentious. Thus, the literature review found consensus to be negative factor regarding its impact on the four issues addressed in these four questions. All four were expected to show a negative relationship with consensus, and although they were not part of the legitimacy elements used to calculate the Legitimacy Index, it seems reasonable that legitimacy could be harmed if these issues remain unaddressed.

One of the more complicating aspects of watershed collaboration involves how to deal with impacts occurring outside of the watershed. It seems reasonable to presume that an extraordinary concern for achieving consensus can lead to the avoidance of issues outside of the watershed that can prompt controversial or unpopular actions. Indeed, the literature review shows that consensus can lead to avoidance of contentious or difficult issues in general. Impacts that occur outside of the watershed certainly fit into that category. However, I ran a Chi-Square test of two categories of consensus, consensus and non-consensus, versus three categories of concern for issues outside of the watershed and found no significant positive or negative effect. The dependent variable here was concern for impacts outside the watershed and it was derived from a Likert style question from the survey, with the coding reversed as described earlier so
higher values showed a higher concern for impacts outside of the watershed. The question read as follows, “My watershed organization should consider impacts that may occur outside of the watershed, not just downstream, but in adjacent basins as well.” The seven possible Likert responses were then grouped into three categories. Strongly and mostly agree were in one category. Slightly agree, neither agree or disagree, and slightly disagree were in a second category. Mostly and strongly disagree were place in a third category. No respondents selected strongly disagree or mostly disagree, and so there were only two final categories for testing. The Chi-Square value for this test was 0.887 which had a one-tailed probability of 0.321 and is insignificant at the 0.10 level. Thus, no relationship was found between consensus and the concern for issues outside of the watershed.

Beyond the specific question regarding the effect of consensus on issues outside of the watershed is the more general question regarding the inclusion of all important issues in the deliberative process. As mentioned earlier, some critiques of consensus-based natural resource collaborations revolve around the tendency of these groups to avoid some contentious issues in order to more easily get agreement from all stakeholders. I again used a Chi-Square test to determine if a significant relationship exists between consensus and the desire to deal with all of the important issues in watershed. I tested two levels of consensus against two levels of agreement with the statement that all issues were being addressed in the watershed. This question read, “The most important issues in my watershed, no matter how contentious, are always addressed by my watershed organization.” I used two levels of consensus rather than five to avoid a very small number of expected values for some cells. Less than 5 values per cell reduce the statistical power, or ability to detect a genuine effect of the test. Thus, there were two levels of agreement (categories) for dealing with all the issues. Respondents who strongly, mostly,
or slightly agreed that all issues are being addressed got a 2 value, and made up one category. Those who strongly disagreed, mostly disagreed, slightly disagreed, or neither agreed nor disagreed were given a value of 1, and made up a second category. However, even with two levels of agreement, I still had two categories slightly below the recommended count of 5 per cell, as the SPSS output below shows. I proceeded with the test anyway, and came up with a Chi-Square value of 0.212 which was also insignificant at the 0.10 level (p = 0.323) for a one-tailed test. This test also fails to detect a relationship between consensus and the need to deal with all issues in the watershed.

I also tested the relationship between consensus and protection for environmental interests, because some previous works concluded that consensus can often lead to abandonment of environmental goals. A Chi-Square test was again run comparing consensus (two levels of consensus – consensus or non-consensus) versus the protection of environmental interests. The question on local environmental issues was worded as follows, “Local environmental issues and concerns are considered important in the deliberation process of my watershed group.” I reduced my Likert data (question on environmental interests) to categorical data, and of course reversed the coding for the 7 possible answers. The results were reduced to two levels, with level 1 representing low levels of concern for local environmental issues and level 2 representing high levels of concern. The reduction of data was done because multiple ties of values are common when you have a Likert scale with only 7 possible choices. The Chi-Square test was again insignificant at the 0.10 level for a one-tail test, with a Chi-Square value of 0.832. Again, consensus showed no relationship to the dependent variable, in this case concern for local environmental issues.
Another Chi-Square test was conducted comparing consensus versus environmental interests, but this time national environmental interests were examined as opposed to local environmental issues. The question on national environmental issues was worded as follows, “National environmental issues and concerns are considered important in the deliberation process of my watershed group.” The responses to this question were likewise grouped into a high or low category, with Likert responses 1, 2, and 3 (strongly agree, mostly agree, slightly agree) being placed into the high agreement category (categorical value = 2), and Likert responses 4, 5, 6, and 7 (neither agree nor disagree, slightly disagree, mostly disagree, and strongly disagree) being placed into the low agreement category (categorical value = 1).

The expectation from the literature was that consensus will work against national environmental concerns. But, again, the Chi-Squared, one-tailed test was insignificant at the 0.10 level, with a Chi-Square value of 0.250, and p = 0.3085. All of the SPSS outputs for these four tests (7, 8, 9, and 10) can be seen in Appendix D. The results are also visible in Table 6.6 directly below.

So, while consensus showed a negative impact on perceived legitimacy (via LI values), it did not show a negative impact as expected on concerns for issues outside of the watershed, the desire to attack all contentious issues, or the concern for both local and national environmental issues. These results contradict much of the literature on this subject, but the results are limited to just three watersheds. Despite the good news regarding consensus in these three watersheds, there remains the potential problem related to inclusiveness. That is the subject of the next few tests below.
Consensus (2 Levels – yes or no) versus Inclusiveness (2 Levels): Chi-Square

Consensus has also been pointed to as something that causes the exclusion of certain interests in the watershed. This occurs because the goal of gaining consensus can sometimes trump inclusiveness, and so certain stakeholders who are expected to be difficult can often be excluded or driven out of the process. One question in the survey asked specifically about inclusiveness and was worded as such, “The deliberation process in my watershed group is inclusive of all stakeholders.” I again grouped the high agreement Likert responses (1, 2, and 3 = strongly agree, mostly agree, slightly agree) into a high category, which I labeled 2 for statistical testing, and the low agreement responses (4, 5, 6, and 7 = neither agree nor disagree, slightly disagree, mostly disagree, or strongly agree) were grouped into the low category, which I labeled number one. A Chi-Square test was again conducted to determine any possible relationship between consensus and inclusiveness. The hypotheses and test results are shown below.

**Null Hypothesis:** There is no significant difference between the consensus and non-consensus based groups regarding the inclusiveness of stakeholder participation.

**Alternative Hypothesis:** Non-consensus-based groups will exhibit more inclusiveness than consensus-based groups.

**Results:** A Chi-Square test of independence was calculated comparing levels of consensus (2 levels – consensus or non-consensus) versus inclusiveness (2 levels – high and low). No significant relationship was found between the two variables for a one-tailed test (Chi-Square =
1.160, p= 0.141) with a 0.10 level of significance. Therefore, the null hypothesis is accepted and the alternative hypothesis is rejected. No relationship is seen here between consensus and inclusiveness. The SPSS output can be seen in Appendix D.

**Consensus (2 Levels – yes or no) versus Inclusiveness: Mann Whitney U Test**

Despite the problem of multiple ties associated with Likert scale data (only 7 possible value options), I used a Mann-Whitney Test anyway to see if a relationship exists between consensus (categorical data – 2 levels) and inclusiveness (ordinal ranked data – 7 possible values). The hypotheses and results for this statistical test are shown below.

**Null Hypothesis:** There is no significant difference between the two categories of consensus (yes or no) regarding the Likert values for inclusiveness.

**Alternative Hypothesis:** Consensus-based groups will exhibit significantly smaller Likert scale values for inclusiveness than non-consensus based groups.

**Results:** A Mann-Whitney U test was conducted to examine the differences between consensus and non-consensus based watershed respondents for Likert values of inclusiveness. A significant result was found at the 0.10 level for a one-tailed test (Mann Whitney U = 225, p = 0.066 <0.10). Examining the chart in Appendix D, it can be seen that the consensus-based respondents were more numerous (count = 7) in the low category of inclusiveness than in the expected category (expected count = 5.4). Conversely, the consensus respondents were less numerous (15) in the
high inclusiveness category (2.00) than expected (16.6). Therefore, the statistically significant probability of 0.066 is due to consensus-based respondents exhibiting less inclusiveness in their watersheds than non-consensus based respondents. This is what I expected from my one-tailed test based on the literature, and confirms in these three watersheds the problematic characteristics of consensus-based groups with regard to inclusive participation. There is a significant difference between consensus and non-consensus respondents regarding inclusiveness, with the consensus group exhibiting less inclusiveness as expected by the literature review. The SPSS output for this test can be seen in Appendix D. A table showing all the results for consensus related issues can be seen below in Table 6.6.

Conclusions: The Impact of Consensus on Legitimacy Values and other Related Factors

Despite expectations to the contrary, consensus had very little negative impact on several legitimacy related variables, such as dealing with difficult issues, concerns for impacts outside of the watershed, and environmental issues at either the local or national scale. However, as the last Mann-Whitney Test indicated (Test 12), lack of inclusive participation is a threat to the legitimacy of consensus-based watershed collaborations. In addition, a Mann-Whitney U test found that consensus exhibited a negative relationship with perceived legitimacy (LI values). Thus, these statistical tests while exploratory in nature, did uncover a negative effect of consensus on both inclusiveness and overall perceived legitimacy. Analysis of individual survey questions dealing with inclusiveness will be described later, and it will be seen that some of those results also point to problems associated with the consensus-based mode of decision-making. There was great enthusiasm overall in the focus groups for consensus, but there was also some
discussion about its negative aspects as well. Statistical tests on survey results reinforced some of these drawbacks with regards to both inclusiveness and overall perceived legitimacy. These results warrant further investigation on the effect of consensus on legitimacy.

**TABLE 6.6 - Consensus vs. Legitimacy and Other Variables**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Statistical Test</th>
<th>Test Statistic</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consensus – 4 Levels</td>
<td>LI-Survey Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 7.364</td>
<td>*</td>
</tr>
<tr>
<td>Consensus – 4 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 4.743</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>LI-Survey Weights</td>
<td>Mann Whitney U</td>
<td>U = 218.5</td>
<td>*</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Mann Whitney U</td>
<td>U=244</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 4 Levels</td>
<td>LI-Survey Weights</td>
<td>Spearman Rank</td>
<td>Rho = -0.063</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 4 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Spearman Rank</td>
<td>Rho = 0.887</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>Concern for Outside Impacts</td>
<td>Chi Square</td>
<td>Chi = 0.887</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>Addressing All Critical Issues</td>
<td>Chi Square</td>
<td>Chi = 0.212</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>Concern for Local Environmental Issues</td>
<td>Chi Square</td>
<td>Chi = 0.832</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>Concern for Nat’l Environmental Issues</td>
<td>Chi Square</td>
<td>Chi = 0.250</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>Inclusiveness</td>
<td>Chi Square</td>
<td>Chi = 1.160</td>
<td>NS</td>
</tr>
<tr>
<td>Consensus – 2 Levels</td>
<td>Inclusiveness</td>
<td>Mann Whitney U</td>
<td>U = 225</td>
<td>*</td>
</tr>
</tbody>
</table>

* Significant at the 0.10 Level
** Significant at the 0.05 Level

NS = Not Significant
(D) Participatory Diversity: Statistical Test Results

The literature search found that some researchers concluded legitimacy in watershed planning was easier to achieve if the study region is relatively homogenous regarding its demographic make-up. For this reason, I examined how demographic diversity affected legitimacy in my survey. Diversity for this study was divided into two types: demographic diversity of residents in the watershed and diversity of the survey respondents. I had much more detailed data for my survey respondents and this section will deal with their demographics. The methodology for determining the demographic make-up of the citizens in the watershed involved analysis using a geographic information system (GIS) overlay and from extracting data tract by tract for the watersheds, and those results will be discussed in more detail the next section. Also, some demographic factors of the watershed were tested here and a discussion of those results will follow. In addition, demographic factors will be discussed in greater detail in the section on elements of legitimacy.

For now, a brief overview of the demographics of the three groups is warranted, so as to underscore the homogenous make-up of the watershed group participants. I have put this overview into chart form (Table 6.7 below) for easy reading. Looking at this table below, it can be seen that the watershed group participants (48 respondents who decided to answer these questions, and only 44 answered the income questions) are mostly white (96%), male (56%), have incomes in the upper middle class to upper class range (82 percent over $50,000 per year, with 27 percent making over $100,000), and are highly educated (42% with a Masters or PhD degree). The only demographic variable examined in the survey that was evenly spread was residence type -- with a mix of group participants coming from rural areas (15%), small towns
(15%), towns (16%) small cities (38%), and large cities (16%). Regarding the demographics of the survey respondents, the first factor I wanted to test was income. The test procedures for this variable are described below.

### TABLE 6.7 - Demographic Diversity: Percentage Breakdown for Survey Respondents (48 survey respondents, 44 for Income) for Selected Factors

<table>
<thead>
<tr>
<th>Race</th>
<th>96% White</th>
<th>0% Black</th>
<th>4% Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>56% Male</td>
<td>44% Female</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>2%</td>
<td>16%</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Under $19,999 Year</td>
<td>$20,000-$49,999 Year</td>
<td>$50,000-$74,999 Year</td>
</tr>
<tr>
<td>Education</td>
<td>0%</td>
<td>8%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>No College or Tech School</td>
<td>Attended 2 or 4 Year School</td>
<td>Graduated College</td>
</tr>
<tr>
<td>Residence Type</td>
<td>15% Rural Area</td>
<td>15% Small Town (5000-2999)</td>
<td>16% Town (3000-19,999)</td>
</tr>
</tbody>
</table>

### Income (7 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

There was a survey question on income that had the respondents place themselves into one of the seven categories and read as follows: “Select your annual income range.” The seven available choices were (1) under 10,000 dollars, (2) 10,000 to 19,000 dollars, (3) 20,000 to 49,999 dollars, (4) 50,000 to 74,999 dollars, (5) 75,000 to 99,999 dollars, (6) 100,000 to 149,999 dollars, and (7) 150,000 dollars or more. Because the literature review values were ranked, I was able to run a Kruscal-Wallis test for ranks using the seven categories for comparison. There was nothing in the literature that indicated higher or lower incomes would result in more legitimacy,
so I used a two-tailed test and simply looked for significant differences for the two groups. The hypotheses and results for this Mann Whitney U test of ranks are shown below.

**Null Hypothesis:** There is no significant difference between the seven income groups regarding legitimacy (LI with Survey Weights)

**Alternative Hypothesis:** There is a significant relationship between income and legitimacy (LI with Survey Weights)

**Results:** A Kruskal-Wallis test was conducted to examine the difference in legitimacy index values (survey weights) for the seven different levels of income. No significant difference in the results was found for the seven levels of income. The H value of 3.098 was insignificant (p = 0.797) at the 0.10 level for this two-tailed test. The null hypothesis is accepted. I therefore reject the alternative (test) hypothesis. There is no relationship between income and the perceived legitimacy of the respondents based on the LI values using survey weights. The SPSS output for this Kruskal-Wallis test is seen in Appendix D

**Income (7 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test**

I also ran a Kruskal-Wallis test for legitimacy index values using literature review weights instead of survey weights. Again, be aware that LI values are a measure of perceived legitimacy as determined by the survey respondents, and weighted two different ways.
**Null Hypothesis:** There is no significant difference between the seven income groups regarding legitimacy (LI with Literature Review Weights)

**Alternative Hypothesis:** There is a significant relationship between income and legitimacy (LI with Literature Review Weights)

**Results:** A Kruskal-Wallis test was conducted to examine the difference in legitimacy index values (literature review weights) for the seven different levels of income. No significant difference in the results was found for the seven levels of income. The H value of 1.480 was insignificant (p = 0.961) at the 0.10 level form this two-tailed test. The null hypothesis is accepted. I therefore reject the test hypothesis, or alternative hypothesis. There is no relationship between income and the perceived legitimacy of the respondents based on the LI values using literature review weights. The SPSS output for this Kruskal-Wallis test is seen in Appendix D.

**Income (7 Levels) versus Legitimacy Index (Survey Weights): Spearman Rank Correlation**

A Spearman Rank Correlation was also run in order to detect any relationships between income and legitimacy. The initial question from the survey had respondents select one of seven income categories, which represented one of the ordinal variables. The other ordinal variable to be ranked was the Legitimacy Index (Survey Weights). The hypotheses and results follow:
**Null Hypothesis:** There is no significant relationship between income (7 Levels) and the Legitimacy Income (Survey Weights)

**Alternative Hypothesis:** There is a significant relationship between income (7 Levels) and the Legitimacy Income (Survey Weights)

**Results:** A Spearman Rho correlation coefficient was calculated for the relationship between income and legitimacy (Legitimacy Index with Survey Weights). An extremely weak (almost non-existent) insignificant relationship was found (Rho = -0.038, p = 0.808 > 0.10). Based on this very small value it is safe to conclude that no relationship exists between income and legitimacy as determined by the Legitimacy Index value (Survey Weights). The SPSS output for this Spearman Rank test can be seen in Appendix D.

**Income (7 Levels) versus Legitimacy Index (Literature Review Weights): Spearman Rank Correlation**

The final test on income was a Spearman-Rank Correlation test to determine if a relationship exists between income and legitimacy, as determined by the LI using literature review weights rather than survey weights. LI value rankings were compared to seven different levels of income that were gotten from the survey question. A two-tailed test was again used because there was no directional expectation regarding the possible relationship.
Null Hypothesis: There is no significant relationship between income and legitimacy (LI using literature review weights)

Alternative or Test Hypothesis: There is a significant relationship between income and legitimacy (literature review weights)

Results: As can be seen from the table in the SPSS output table in Appendix D, the correlation between the variables income (7 Levels) and Legitimacy (LI – using literature review weights) was represented by a Spearman Rho value of -0.018. This Spearman Rho value has a probability of 0.906 and is thus insignificant (p >0.10). The null hypothesis is accepted and the alternative hypothesis is rejected. No relationship between income and perceived legitimacy as measured by LI values (literature review weights) is detected. This is similar to the result of the LI values using survey weights. The SPSS output tables of results can be seen in Appendix D.

Conclusions: From the five tests above, it is very clear that no relationship exists between income and legitimacy. It does not matter what level of income the data is categorized into, or which of the two Legitimacy Index values is used, there is no relationship between income and legitimacy within the three watersheds studied here.

Education (5 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

Education is another demographic factor I wanted to test against legitimacy. One question on the survey asked participants to select one of 11 levels of education: (1) no formal
education, (2) attended grammar school, (3) graduated grammar school, (4) attended high school, (5) graduated high school, (6) attended community college or technical school, (7) attended 4-year college or university, (8) graduated college, (9) attended graduate school, (10) received a professional degree, M.A, or M.S, (11) or received a PhD. Because this was such a highly educated group of survey respondents, with nobody falling into the first five categories of education, I decided to reduce the number of categories for statistical testing purposes. I decided on five groupings mostly based on the number of people in each group. Category 1 contained five people who had attended community college, technical school, or a 4-year college. Category 2 contained seventeen people who had graduated from college. Category 3 had seven people who had attended graduate school. Category 4 contained fourteen people who had received a professional degree, M.A., or M.S. Category 5 contained six people who had completed a PhD.

A Kruskal-Wallis test was conducted for these five education levels against the legitimacy index (Survey Weights). The hypotheses and results follow. No effect for education was expected so a two-tailed test was used.

**Null Hypothesis:** There is no significant relationship between education level and legitimacy (survey weights).

**Alternative or Test Hypothesis:** There is a significant relationship between education level and legitimacy (survey weights).
**Results:** A Kruskal-Wallis test was run for education and legitimacy (LI using survey weights). The H value was low (2.940) and the probability (0.568) well below the significance level of 0.10. This relationship is insignificant. The null hypothesis is accepted and the alternative hypothesis is rejected. No relationship between education and perceived legitimacy based on survey weights is detected. The SPPS output tables for this Kruskal-Wallis test are in Appendix D.

**Education (5 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test**

Another Kruskal-Wallis test was run for the five education levels against the legitimacy index, but this time using literature review weights. Similar hypotheses were proposed for this test, and the results are shown below. Again, no effect for education was expected so a two-tail test was used.

**Null Hypothesis:** There is no significant relationship between education level and legitimacy (literature review weights).

**Alternative or Test Hypothesis:** There is a significant relationship between education level and legitimacy (literature review weights).

**Results:** A Kruskal-Wallis test was run for education and legitimacy (LI using literature review weights). The Chi-Square value was low (1.104) and the probability (0.894) well below the
significance level of 0.10. This relationship is non-significant. No relationship was detected between LI values (literature review weights) and education. The null hypothesis is accepted and the alternative hypothesis is rejected. The SPSS output tables for this Kruskal-Wallis test can be seen in Appendix D.

**Residence Type (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test**

The relationship of residence type was also tested against legitimacy. One question on the survey asked participants to select one of 7 types of residence: (1) rural, (2) small village of less than 500 people, (3) village with 500 to 1499 people, (4) small town of 1500 to 1499 people, (5) town of 3000 to 19,999 people, (6) small city of 20,000 to 99,999 people, or (7) or a large city of over 100,000. I grouped these choices into four categories based on how many people were in each group. Category 1 contained the rural, small village and village categories, and consisted of 12 respondents. Category 2 contained the small town and town categories, and had eleven people in this group. Category 3 contained the small city group, and eighteen people were in this category. Category 4 contained the eight survey respondents who lived in large cities.

A Kruskal-Wallis test was run for these four residence types against the legitimacy index (survey weights). The hypotheses and results follow. No effect for residence type was expected so a two-tailed test was used.

**Null Hypothesis:** There is no significant relationship between residence type and legitimacy (survey weights).
**Alternative or Test Hypothesis:** There is a significant relationship between residence type and legitimacy (survey weights).

**Results:** A Kruskal-Wallis test was run for residence type and perceived legitimacy (LI using survey weights). The H value was low (2.543) and the probability (0.468) well below the significance level of 0.10. This relationship is non-significant. No relationship between perceived legitimacy using survey weights and residence type is seen here. The null hypothesis is accepted and the alternative test is rejected. The SPSS output tables for this Kruskal-Wallis test can be seen in Appendix D.

**Residence Type (4 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test**

A Kruskal-Wallis test was also run for these four residence types against the legitimacy index using literature review weights. The hypotheses and results follow. No trend for residence type was expected so a two-tailed test was again used.

**Null Hypothesis:** There is no significant relationship between residence type and legitimacy (literature review weights).

**Alternative or Test Hypothesis:** There is a significant relationship between residence type and legitimacy (literature review weights).
**Results:** A Kruskal-Wallis test was run for residence type and perceived legitimacy (LI using Literature Review Weights). The H value was low (3.383) and the probability (0.336) was above the significance level of 0.10. The relationship between perceived legitimacy (literature review weights) and residence type is non-significant. The null hypothesis is accepted and the alternative hypothesis is rejected. The SPSS output for this test can be seen in Appendix D.

**Stakeholder Group (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test**

Would an individual’s stakeholder group affect his or her legitimacy ratings? One question in the survey asked respondents to choose their appropriate stakeholder group from a list. I reduced these categories into four major types: (1) government and educational institutions, (2) grassroots or environmental groups, (3) public citizen, (4) farmers, real estate developers, and industry representatives. There were twenty-five people in the first group of governmental and educational institutions. There were fourteen people in the second group representing grass-roots or environmental organizations. The third category consisted of four people who identified themselves as public citizens. The fourth group consisted of five people who were commercial farmers, real estate developers, or industry representatives. Table 6.8 below shows the breakdown for these four major types of stakeholders. The next table below (6.9) shows the exact breakdown of survey respondents into various stakeholder groups as determined by the raw data (survey questions).
Table 6.8 - Stakeholder Grouping for Statistical Testing Purposes
Government and Educational Institutions (25)
Grassroots or Environmental Groups (14)
Public Citizens (4)
Farmers, Real Estate Developers, and Industry Representatives (5)

Table 6.9 - Survey Respondents By Stakeholder Group (From survey question 11-2)
Local Government Agency (15)
Grassroots Citizen or Local Environmental Group (14)
State Government Agency (8)
Public Citizens (4)
Commercial Grain Farmer (2)
Real Estate Developer (2)
Educational Institution (1)
Federal Government Agency (1)
Industry Representative (1)
Commercial Dairy Farmer (0)
Other Agribusiness (0)
Commercial Vegetable and/or Fruit Farmer (0)
National Environmental Group (0)
Commercial Livestock Farmer (0)
Recreation Business Interest (0)
Other Business Interest (0)

The Kruskal-Wallis test for comparison of ranks was applicable because there were more than two categories, and the legitimacy index values are from ordinal data. Nothing in the literature indicated that respondents from one major group or the other would have greater perceived legitimacy, but I theorized that those more actively involved in watershed collaborations would likely rate the legitimacy of such efforts higher than those whose participation was less frequent and intense. For this reason, I conducted a one-tailed test and theorized that government officials (25 people in group 1) would exhibit greater perceived legitimacy for their survey responses than the other three groups. Table 6.8 above shows the aggregation of survey respondents into these four groups for statistical testing purposes. The hypotheses and results for this Kruskal-Wallis test are shown below.
**Null Hypothesis:** There is no significant difference between the four stakeholder groups regarding legitimacy (LI using survey weights).

**Alternative or Test Hypothesis:** The government stakeholder group will have significantly higher legitimacy values (LI with Survey Weights) than the other three groups.

**Results:** A Kruskal-Wallis test was run for legitimacy values (LI using Survey Weights) and stakeholder groups (four main types). The Kruskal-Wallis test came up with a H value of 3.304 and a probability of 0.347. This is insignificant for a one-tailed test (0.347 > .10) and thus the null hypothesis is accepted and the alternative hypothesis is rejected. There is no relationship detected here between stakeholder group and perceived legitimacy (using survey weights). The SPSS output tables for this Kruskal-Wallis test is seen in Appendix D.

**Stakeholder Group (4 Levels) versus Legitimacy Index (Literature Review Weights):**

**Kruskal-Wallis Test**

I ran another Kruskal-Wallis test for stakeholder groups, but this time used the LI based on literature review weights. I again hypothesized that Group 1 (government and educational officials) would exhibit greater perceived legitimacy (using literature review weights) based on intense involvement with watershed collaborations.

**Null Hypothesis:** There is no significant difference between the four stakeholder groups regarding legitimacy (LI using survey weights).
**Alternative or Test Hypothesis:** The government stakeholder group will have significantly higher legitimacy values (LI with survey weights) than the other three groups.

**Results:** A Kruskal-Wallis test was run for legitimacy values (LI using Literature Review Weights) and stakeholder groups (4 main types). The Kruskal-Wallis test came up with a $H$ value of 1.251 and a probability of 0.741. This is insignificant for a one-tailed test ($0.741 > 0.10$), and thus the null hypothesis is accepted and the alternative hypothesis is rejected. There is no relationship detected here between stakeholder group and perceived legitimacy as measured with literature review weights. This is the same as result found for the test above using survey weights. The SPSS output tables for this Kruskal-Wallis test can be seen in Appendix D.

**Stakeholder Type (2 Levels) versus Legitimacy Index (Survey Weights): Mann-Whitney U Test**

I did another type of test comparing stakeholder type and perceived legitimacy, but this time I reduced these categories into two major types: government and educational institution versus all other stakeholder groups. The former group represents professionals involved in various formal agencies and organizations, whereas the latter group consists of all other private citizens and groups -- including farmers, real estate developers, environmental groups, and general citizens. This seemed like a natural division for comparison. Also, when the respondents are divided this way you get roughly equal numbers of people in the government/education group (25) as you get in the general citizen group (23). The Mann-Whitney U test for comparison of ranks was applicable because there were only two categories
and the legitimacy index values are ordinal data. The first test compared Group Status to LI values (survey weights).

As with the four group test, I theorized that those more actively involved in watershed collaborations would likely rate the legitimacy of such efforts higher than those whose participation was less frequent and intense. So, again I conducted a one-tailed test and theorized that government officials would exhibit greater perceived legitimacy in their survey responses. The hypotheses and results for this Mann-Whitney U test are shown below.

**Null Hypothesis:** There is no significant difference between the government stakeholder group versus private groups and citizens regarding legitimacy (LI using survey weights).

**Alternative or Test Hypothesis:** The government stakeholder group will have significantly higher legitimacy values (LI with survey weights) than the private citizen group.

**Results:** A Mann-Whitney U test was run for legitimacy values (LI using Survey Weights) versus stakeholder group (two main types). The Mann-Whitney value was 222.000 with a probability of 0.088 (0.176/2) for a one-tailed test. This is just lower than the 0.10 cutoff for a one-tailed test, making this test significant. Unlike the statistical comparisons of the four stakeholder groups and LI values, this two-group comparison does show a significant difference. The government stakeholders do exhibit a greater perceived legitimacy than all other stakeholders combined, at least when using a survey weighted system for LI values. The SPSS output for this Mann Whitney U test can be seen in Appendix D.
Stakeholder Type (2 Levels) versus Legitimacy Index (Literature Review Weights): Mann-Whitney U Test

I conducted a Mann-Whitney U test for two stakeholder groups and perceived legitimacy, but this time used the LI based on literature review weights. The two main stakeholder groups representing governmental agencies and citizens were the two categories tested using Mann-Whitney analysis of ranks. The hypotheses and results follow.

**Null Hypothesis:** There is no significant difference between the government stakeholder group and the general citizen group regarding legitimacy (LI using literature review weights).

**Alternative or Test Hypothesis:** The government stakeholder group will have significantly higher legitimacy values (LI with literature review Weights) than the general citizen group.

**Results:** The Mann-Whitney U test was run comparing stakeholder group (two main types) against legitimacy (LI values using Literature Review Weights). The resulting Mann-Whitney U value was 287.000 with a one-tailed probability of 0.496 which is insignificant at the 0.10 level. There was no significant relationship found between stakeholder group (two main types) and legitimacy (LI using literature review weights). The null hypothesis is accepted, and the alternative hypothesis is rejected. The SPSS output for this test can be seen in Appendix D. Like the test for consensus and LI, this Mann-Whitney U test was significant when survey weights were used in the LI calculation, but negative for literature review weights. These are the only
two tests where the same test using different weighting systems (survey and literature review) came up with different conclusions.

**Group Participant Status (2 Levels) versus Legitimacy Index (Survey Weights): Mann-Whitney U Test**

It can reasonably be expected that those people who are actively engaged in watershed collaborative groups will have a greater stake in the success of these groups, and should therefore have a higher perception of the legitimacy of these organizations. As discussed in Chapter 2, the literature review bears out this line of thinking as well. For these reasons, I decided to test the perceived legitimacy of respondents who are presently participating in watershed groups versus those who are not. It should be noted that some of the people not presently involved are past participants. Some of these past participants may be people who were disenchanted with either the process or the outcomes, and should represent a bit of a dissenting opinion from those who are more emotionally and professionally connected to the efforts of collaborative watershed management. A question on the survey asked respondents if they were presently working within a watershed group, and so I had this data for the two groups. Below are the hypotheses and results for those tests, one test of participant status versus LI values of perceived legitimacy using survey weights, and one with LI values based on literature review weights. I conducted a one-tailed test based on literature review that indicated active participants would rate legitimacy higher than those who are not active.
Null Hypothesis: There is no significant difference between the active watershed group participants and those not currently engaged in watershed group activities regarding legitimacy (LI using survey weights).

Alternative or Test Hypothesis: The active watershed group participants will exhibit greater perceived legitimacy of watershed planning (higher LI values using survey weights) than those not currently engaged in watershed group activities.

Results: A Mann-Whitney U test was conducted comparing the status of the group participants (two main types – active or not currently active) against perceived legitimacy (LI values using Survey Weights). The Mann-Whitney U value was 175.000 with a probability of 0.039 for a one-tailed test, which is significant at the 0.05 level. The SPPS output for this Mann-Whitney U test is in Appendix D.

So, I conclude that the active group participants significantly rated watershed activity as more legitimate (using LI with Survey Weights) than those who are not currently active. The null hypothesis is rejected and the alternative or test hypothesis is accepted. There is indeed a significant difference between active and non-active watershed group survey respondents regarding legitimacy, as expected, at least when using LI values based on survey weights. This is not a surprise considering past research and results from the literature review. The next test will test participant status against perceived legitimacy using literature review weights.
Group Participant Status (2 Levels) versus Legitimacy Index (Literature Review Weights):

Mann-Whitney U Test

The Mann-Whitney test was also used to test the LI values using literature review weights. The two main groups of participants (active versus non-active) were again compared to the LI values (literature review weights). The hypotheses, results, and SPPS output are shown below.

Null Hypothesis: There is no significant difference between the active watershed group participants and those not currently engaged in watershed group activities regarding perceived legitimacy (LI using literature review weights).

Alternative or Test Hypothesis: The active watershed group participants will exhibit greater legitimacy (higher LI values using literature review weights) than those not currently engaged in watershed group activities.

Results: A Mann-Whitney U test was conducted comparing the status of the group participants (two main types – active or not currently active) against legitimacy (LI values using Literature Review Weights). The Mann-Whitney U value was 171.500 and the probability was 0.0325 for a one-tailed test, which was also significant at the 0.05 level. So, again I can conclude that the active group participants significantly perceived watershed activity as more legitimate than those who are not currently active. The null hypothesis is rejected and the alternative or test hypothesis is accepted. Group participant status (active presently or not) does exhibit a
significant relationship to perceived legitimacy, using both weighting systems utilized in this study. The SPSS output results for this Mann-Whitney U test can be seen in Appendix D.

Conclusions: Demographic Diversity Factors and Perceived Legitimacy

A table summarizing the statistical tests between demographic factors and perceived legitimacy is seen below (Table 6.10). Stakeholder type and participant status were the only demographic factors that had a significant relationship to legitimacy. Stakeholders who fell into the government category had a significantly higher perceived legitimacy values (LI) than those from non-governmental stakeholder groups, but only for the test of LI using survey-based weights. Active group participants likewise exhibited higher LI values than the second group comprised of non-participants and former (not active) participants. It is important to note that the significant difference between participants and non-participants held up for both LI values — LI using survey weights and LI using literature review weights. This was expected because people want to validate their efforts. Thus, they are more likely to rate these efforts higher (greater perceived legitimacy). The amount of time spent in watershed group activities can be very substantial, and it is human nature to want to believe that you are not wasting your time. Rating your group’s legitimacy as low would be one way of diminishing your own work, and so higher perceived legitimacy values were expected, and were realized for the survey respondents in this study.
Table 6.10 - Demographic Diversity Factors vs. Perceived Legitimacy (LI) - Statistical Test

Results

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Statistical Test</th>
<th>Test Statistic Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income – 7 Levels</td>
<td>LI-Survey Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 3.098</td>
<td>NS</td>
</tr>
<tr>
<td>Income – 7 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 1.480</td>
<td>NS</td>
</tr>
<tr>
<td>Income – 7 Levels</td>
<td>LI-Survey Weights</td>
<td>Spearman-Rank Correlation</td>
<td>Rho = 0.038</td>
<td>NS</td>
</tr>
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<td>Income – 7 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Spearman-Rank Correlation</td>
<td>Rho = 0.018</td>
<td>NS</td>
</tr>
<tr>
<td>Education – 5 Levels</td>
<td>LI-Survey Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 2.940</td>
<td>NS</td>
</tr>
<tr>
<td>Education – 5 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 1.104</td>
<td>NS</td>
</tr>
<tr>
<td>Residence Type – 4 Levels</td>
<td>LI-Survey Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 2.543</td>
<td>NS</td>
</tr>
<tr>
<td>Residence Type – 4 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 3.383</td>
<td>NS</td>
</tr>
<tr>
<td>Stakeholder Group – 4 Levels</td>
<td>LI-Survey Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 3.304</td>
<td>NS</td>
</tr>
<tr>
<td>Stakeholder Group – 4 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Kruskal- Wallis</td>
<td>H = 1.251</td>
<td>NS</td>
</tr>
<tr>
<td>Stakeholder Group – 2 Levels</td>
<td>LI-Survey Weights</td>
<td>Mann Whitney U</td>
<td>U = 222</td>
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</tr>
<tr>
<td>Stakeholder Group – 2 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Mann Whitney U</td>
<td>U = 287</td>
<td>NS</td>
</tr>
<tr>
<td>Group Participant Status – 2 Levels</td>
<td>LI-Survey Weights</td>
<td>Mann Whitney U</td>
<td>U = 175</td>
<td>**</td>
</tr>
<tr>
<td>Group Participant Status – 2 Levels</td>
<td>LI-Literature Review Weights</td>
<td>Mann Whitney U</td>
<td>U 171.5</td>
<td>**</td>
</tr>
</tbody>
</table>

* Significant at the 0.10 Level  ** Significant at the 0.05 Level  NS = Not Significant

This brings up one of the main problems with these types of surveys, however. As Coglianese points out (2002), perceptions of the “success” of watershed activities are highly dependent on the background and agenda of those interviewed. As such, many of these surveys can be seen as a biased and unreliable measure of success. This is one reason why I tried to
enlist knowledgeable non-participants in my survey, but I was dependent on watershed group facilitators for contact lists, and most of the people on those lists were participants or past participants. Also, I was measuring perceived legitimacy rather than success, even though the two are closely linked with the latter heavily dependent on the former (among other things). This should be kept in mind when analyzing these results.

(E) Demographic Comparison of the Watershed versus Participants: Representative Legitimacy

Are the participants of the watershed collaborative organizations representative of the entire population of their particular watershed? This is an important question due to the importance of what was termed “representative legitimacy” in the literature. In order to answer that question I had to get demographic data about the population of the watersheds from the U.S. Census Bureau and compare it to the demographics of my survey respondents. The survey respondents were a fairly homogenous group; with highly educated, upper middle class whites making up a large portion of watershed group representation. This data will be compared to the watershed as a whole in a later section. Whites made up 96 percent of the total of respondents. Gender was only somewhat stilted towards males (about 56 percent), but income levels were highly weighted in favor or upper-middle class and upper class people. The percentage of people earning less than 50,000 dollars per year was a meager 18 percent, as opposed to 27 percent who made over 100,000 dollars per year. But the biggest disparity was found in education levels, with only 8 percent of the respondents indicating they had not graduated from college.
It is important to note that 42 percent had either a Master’s degree or a PhD, and another 15 percent attended graduate school. The only demographic that was not stilted toward one group or set of groups in watershed organizations was residence type. It seemed that the representatives of watershed groups came from urban, town, and rural areas with about the same amount of frequency.

In order to compare these survey respondents to the watershed residents they represented, I had to gather census data. The first type of census file used was the SF1 file; which contains race, age, and gender demographic information and is based on Census Bureau surveys that are sent out to all households. Another type of census form that is sent out to selected (sample) households only is known as SF3, but these files have been replaced by American Community Survey Data (ACS) for the year 2010. In the case of either SF3 or ACS data, a sample of households is used rather than a complete inventory of all households as is done for SF1 files. The ACS data for 2010 contains two important demographic factors I wanted to investigate and compare to the group participants: income and educational attainment. My focus groups and surveys showed me early on that I was dealing with a highly educated, and I suspected, highly paid group of professionals. So, in addition to extracting race, gender, and age data from the SF1 files; I used the sample data from ACS to get income and education.

In order to get the SF1 data for the SE Fox Basin, a GIS overlay was done for each of the watersheds. Shape files that delineated the boundaries of the watershed were acquired from Wisconsin DNR for SE Fox. A CLIP command in ARC GIS was then used to create a new shape file containing only those counties that touch or are located within the boundaries of the watershed. A shape file for all counties that had tracts contained within or touching the watershed in question was then downloaded from the Census Bureau website. The shape file for
the Wisconsin state counties (from DNR) and the shape files for the Census Bureau counties (tracts within) were not in the same coordinate system and so a conversion was necessary. SF1 data files from the Census Bureau were downloaded and then merged into the census tract shape files using an ARC GIS “Join” command. A “Clip” command in ARC GIS was then used to create a new shape file from the newly merged (joined) shape file (census tracts and SF1 data) and the shape file of the watershed in question.

Some items were deleted or added to the tabular part of these shape files in order to match up with the demographic data (ethnic groupings) as collected via my surveys. The total number of people in each ethnic group (White, Black, Hispanic, Asian, Other) were added to the item for that group, but only for the polygons that were kept intact after the Clip command. For the partial polygons that resulted from the Clip there was no way to be sure how many people from a given ethnic group were within, or outside the boundary of the watershed. To solve this problem, a population density for each ethnic group was calculated by multiplying the number of people in that group times the area of the new polygon. This method would assume a uniform distribution throughout the entire polygon, but it was the only way to estimate the number of people in that group for the newly created polygon. A breakdown of population for each ethnic group within the watershed could then be compiled.

For the other two watersheds, Rock River and Poplar Creek, I found it faster to manually overlay an outline of the watersheds over census tracts, and then identify the tracts that were mostly (more than 50%) within the boundaries of the watersheds. I then extracted the demographic data from the appropriate census tracts. I found this method to be much faster than undertaking complex GIS functions.
The ethnic and gender breakdown of my three watersheds as compared to the same breakdown for the survey participants can be seen in Tables 6.11 and 6.12 shown below.

Table 6.11 - Ethnic Make-Up of Survey Respondents vs. Citizens in the Three Watersheds

<table>
<thead>
<tr>
<th>Watershed</th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
<th>Native American</th>
<th>Asian</th>
<th>Other</th>
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<tbody>
<tr>
<td>Rock River</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>94.7%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5.3%</td>
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<tr>
<td>Citizens</td>
<td>85.77%</td>
<td>3.74%</td>
<td>6.04%</td>
<td>0.29%</td>
<td>2.80%</td>
<td>1.36%</td>
</tr>
<tr>
<td>SE Fox</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>91.7%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>8.3%</td>
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<tr>
<td>Citizens</td>
<td>92.50%</td>
<td>3.36%</td>
<td>1.19%</td>
<td>2.10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poplar Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Citizens</td>
<td>41.47%</td>
<td>4.17%</td>
<td>28.47%</td>
<td>0.23%</td>
<td>12.41%</td>
<td>12.98%</td>
</tr>
</tbody>
</table>

As can be seen from Table 6.11, the racial make-up of the survey respondents does not appear to be significantly different than the make-up of the citizens in the watershed for the Rock River Basin and the SE Fox Watershed. Both are dominated by whites with only a small percentage of minority groups present, and in the case of the survey respondents there were no Blacks or Hispanics. The percentage of white respondents for participants was a bit larger than the watershed as a whole in the Rock River Basin (94.7% versus 85.77%), with the rest of the respondents concentrated in the “other” category rather than being spread between Blacks, Hispanics, Asians, and Native Americans as was the case for the entire watershed. The SE Fox ethnic make-up was close to the watershed as a whole, with very close figures for whites (91.7% for respondents, 92.5% for citizens). As was the case with the Rock River, the “other” category for SE Fox survey respondents contained the remaining 8% of the total, as compared to all of the citizens in the SE Fox which had the non-white citizens spread among Blacks, Hispanics, Asians, and Native Americans. Except for a slight overrepresentation of whites in the Rock River, the
two Wisconsin watershed groups (as represented by the survey respondents) were not much different ethnically from the watershed as a whole.

This was not the case for the Illinois watershed. The biggest disparity between the survey respondents and the citizens in the watershed was found in this smaller, urban Poplar Creek watershed of northeastern Illinois. The general population of this watershed was fairly diverse, with whites making up only 41.47% of the total. By comparison, the survey respondents were 100% white, without a single minority group member. The Poplar Creek citizen group was much more diverse than the respondents: with 28.74% Hispanic, 12.41% Asian, 4.17% Black, 0.23% Native American, and 12.98% some other ethnic group. Representative legitimacy becomes very problematic for the Poplar Creek Watershed Coalition based on the fact that all of the survey respondents were white (100%), which is quite different compared to the watershed as a whole.

The differences in gender make-up between the overall watersheds and the survey respondents can be seen in the Table 6.12 below. Obviously, for the watershed as a whole (Table 6.12) the gender make-up is nearly 50-50, with women having a slight edge over men. Looking at Table 6.17 for the survey respondents, we see that men dominate in the Poplar Creek, but not to a large degree (58.8% to 41.2%).

In the Rock River Basin, the women actually make up the majority of respondents (57.9% to 42.1%), and are overrepresented in this watershed. The most male-dominated watershed is the SE Fox, with 75 percent male. For two of the three watersheds, males dominated the process, but not to a great degree. Still the gender gap is something that does warrant further research as it has the possibility to impact both process and outcome, two major components of the legitimacy in watershed organizations.
Table 6.12- Gender Make-Up of Survey Respondents vs. Citizens in the Three Watersheds

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rock River</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>42.1%</td>
<td>57.9%</td>
</tr>
<tr>
<td>Citizens</td>
<td>49.70%</td>
<td>50.30%</td>
</tr>
<tr>
<td><strong>SE Fox</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Citizens</td>
<td>49.56%</td>
<td>50.44%</td>
</tr>
<tr>
<td><strong>Poplar Creek</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>58.8%</td>
<td>41.2%</td>
</tr>
<tr>
<td>Citizens</td>
<td>49.56%</td>
<td>50.44%</td>
</tr>
</tbody>
</table>

The ACS data was extracted from census tracts and included two factors I was particularly interested in investigating: income and educational attainment. I did manual overlays of the watershed boundaries onto maps containing census tracts, and then extracted this income and education data tract by tract. Any tract that had 50 percent or more of its area within the watershed in question was included for compiling income and educational data. I then compared the income and educational data of the citizens of the watersheds with the same data for the survey respondents. The income in the census tract data was in percentages for several categories of income ranges. I matched the income ranges for my survey data to the categories in the census tracts (so I could compare survey respondents to the citizens in the watershed), and compared percentages. I had to multiply the percentage of the population each tract represented in the watershed (population/total for watershed) times the percentage for each income category, in order to standardize the percentage data and thus account for varying population sizes of the tracts in the watershed. The tables below (6.13 - 6.14) show the comparison of this educational and income data between all citizens in the watershed versus survey participants.
The difference in educational attainment stands out as the bigger difference between the citizens in the watershed versus the respondents, as opposed to income. Looking at the table on education below (Table 6.13), the difference between these two groups in striking, especially for the lowest and highest educational levels. For all three watersheds, over 60 percent of citizens in the watershed have not attained at least a Bachelor’s degree, whereas only 20 percent of the survey respondents have not received a college degree. The same large difference can be seen in the two highest educational categories in the table, which includes people with a Bachelor’s degree, some graduate work, or an advanced degree. While only 25-35% of citizens in the three watersheds have a Bachelor’s degree or higher, over 80% of the survey respondents fit into this high level of educational attainment. From this data it is obvious that the survey respondents represent a much higher level of educational attainment than the overall citizens they represent in the watershed. Considering the heavy representation of individuals from governmental agencies and educational institutions this comes as no surprise, but poses a problem with representative legitimacy nonetheless.

Table 6.13 - Educational Attainment of Survey Respondents vs. Citizens in the Three Watersheds

<table>
<thead>
<tr>
<th>Watershed</th>
<th>High School or Less</th>
<th>Some College – No Degree</th>
<th>Bachelor’s Degree or Graduate Work</th>
<th>Graduate or Professional Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock River</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>0%</td>
<td>5.3%</td>
<td>36.9%</td>
<td>57.0%</td>
</tr>
<tr>
<td>All Citizens</td>
<td>36.06%</td>
<td>29.95%</td>
<td>21.87%</td>
<td>13.17%</td>
</tr>
<tr>
<td>SE Fox</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>0%</td>
<td>16.7%</td>
<td>66.6%</td>
<td>16.7%</td>
</tr>
<tr>
<td>All Citizens</td>
<td>37.37%</td>
<td>30.59%</td>
<td>21.38%</td>
<td>10.65%</td>
</tr>
<tr>
<td>Poplar Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>0</td>
<td>5.9%</td>
<td>53%</td>
<td>41.4%</td>
</tr>
<tr>
<td>All Citizens</td>
<td>39.52%</td>
<td>25.37%</td>
<td>22.99%</td>
<td>12.05%</td>
</tr>
</tbody>
</table>
The situation for the income data, as shown in the table below (Table 6.14), is completely different than that for education. Comparing survey respondents versus all citizens in the watershed below, we see that for the three watersheds the range of values for those who make under $10,000 per year is between 2 and 6 percent. While none of the survey respondents for the three watersheds fall into this lowest income bracket, the 2-6% figure for citizens in the watersheds is not very high either. At the opposite extreme of income for the all citizens in the watershed, we can see that the percentages of people who make more than $100,000 per year (highest two brackets) ranges from 20 to 30 percent for the three watersheds. The percentage for survey respondents in these same two upper income brackets ranges from 10 to 38 percent. This again does not appear to be a large difference, unlike the data discussed above for education. In the middle two income brackets (between $50,000 and $99,999) as seen in the table below, we see that for all citizens in the watershed the percentage ranges from 30 to 40 percent. This is lower than the range of percentage for survey respondents, which is 45 to 60 percent, and represents the largest difference between the citizens versus the survey respondents. So, for the lowest income group (less than $10,000) the survey respondents are slightly wealthier than the citizens in the watershed they represent (2-6% vs. 0%), for the middle income groups ($50,000-$74,999) the survey respondents appear significantly better off (45-60% vs. 30-40%), and for the highest income brackets (over $100,000) the survey respondents appear to be about the same as the general citizens (10-38% vs. 20-30%). Still, this difference in income levels is less than I expected, and seems to be less of a problem for representative legitimacy than education.

Overall for demographic data, education was the one factor that distinguished the survey respondents from the entire watershed population, with gender showing some gaps (more men), and income showing a slight difference (higher middle-upper income people) between the two
groups. Ethnic make-up did not appear to be too different for the survey respondents than for the Wisconsin, even though both were dominated by whites with poor representation by any of the minority groups studied. On the other hand, there existed a huge disparity in ethnic make-up for the urbanized Poplar Creek watershed that contained a large number of minority groups, but was represented by higher income, higher educated whites in the group.

Table 6.14 - Income of Survey Respondents vs. Citizens in the Three Watersheds

<table>
<thead>
<tr>
<th>Income</th>
<th>&lt;$10,000</th>
<th>$10,000-$49,999</th>
<th>$50,000-$74,999</th>
<th>$75,000-$99,999</th>
<th>$100,000-$149,999</th>
<th>&gt;$150,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rock River</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>0%</td>
<td>16.7%</td>
<td>22.2%</td>
<td>22.2%</td>
<td>11.1%</td>
<td>27.8%</td>
</tr>
<tr>
<td>All Citizens</td>
<td>5.95%</td>
<td>37.56%</td>
<td>20.42%</td>
<td>15.26%</td>
<td>12.94%</td>
<td>7.51%</td>
</tr>
<tr>
<td><strong>SE Fox</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>0%</td>
<td>30%</td>
<td>50%</td>
<td>10%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>All Citizens</td>
<td>3.36%</td>
<td>32.04%</td>
<td>20.17%</td>
<td>16.68%</td>
<td>17.83%</td>
<td>9.92%</td>
</tr>
<tr>
<td><strong>Poplar Creek</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td>0%</td>
<td>12.5%</td>
<td>25%</td>
<td>37.5%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>All Citizens</td>
<td>2.43%</td>
<td>28.46%</td>
<td>21.80%</td>
<td>16.37%</td>
<td>18.96%</td>
<td>11.28%</td>
</tr>
</tbody>
</table>

(F) Elements of Legitimacy: Success and Problems

How did the 12 elements of legitimacy as laid out in the literature search, fare as far as the survey was concerned? As would be expected from a survey of people closely linked to watershed collaborative efforts, the Likert scores for most elements of legitimacy were fairly high. However, there were some differences between various elements of legitimacy, again as one would expect, and there were a few elements that were downright problematic. Below is a detailed description of the results of the survey for each of the 12 elements of legitimacy.
1. Inclusiveness

Inclusiveness and representation overlap in that the former involves the number and diversity of representation, whereas the latter focuses more on quality. A later section on representation, like the legitimacy element discussed earlier, will focus on these quality characteristics of representation. For now, inclusive representation will be the theme of this section. The question that served to measure inclusiveness for the legitimacy index (Question 3-6) read as follows, "The deliberation process in my watershed is inclusive of all stakeholders." As a reminder, the respondent was presented with one of 7 options for this question:

1 = Strongly Agree  
2 = Mostly Agree  
3 = Agree  
4 = Neither Agree nor Disagree  
5 = Slightly Disagree  
6 = Mostly Disagree  
7 = Strongly Disagree

Out of a total of 53 respondents who answered this question, 60.8 percent either "strongly agreed" or "mostly agreed" with this statement, as can be seen in Table 6.15 below. These respondents appear to have a very high opinion of the inclusiveness of their particular watershed organization. What is even more important, however, is that only 11 percent (6 people) disagreed with this statement, and 5 of those 6 only slightly disagreed with the statement. There was only one single person who selected mostly disagreed, and there was nobody that strongly disagreed. These results say a lot about the strength of this element within the watershed
organizations represented by the respondents. A chart of the results of this question on inclusiveness can be seen in Appendix F.

A second table aggregated the 7 levels of inclusiveness into three categories: agreed, disagreed, or neither agreed or disagreed with the inclusiveness statement. I also wanted to compare the impact of consensus on inclusiveness, and so I broke down the data into three types of respondents: (1) all respondents, (2) consensus-based group respondents, and (3) non-consensus respondents. The results for this can be seen in Table 6.16 below, and the high degree of agreement can be seen in this table for all three groupings. There appears to be no difference between consensus and non-consensus participants with regard inclusiveness. Most respondents seem to have a high degree of faith in the inclusiveness of their watershed.

Table 6.15 – “The Deliberation Process in My Watershed is Inclusive of All Stakeholders"

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Mostly Agree</th>
<th>Slightly Agree</th>
<th>Neither</th>
<th>Slightly Disagree</th>
<th>Mostly Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.6%</td>
<td>41.2%</td>
<td>17.6%</td>
<td>9.8%</td>
<td>9.8%</td>
<td>2.0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 6.16 - Percentage of Respondents Who Believe Their Watershed is Inclusive: All Respondents, Consensus Respondents, and Non-Consensus Respondents

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Respondents</td>
<td>79%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Consensus Respondents Only</td>
<td>72%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Non-Consensus Respondents Only</td>
<td>82%</td>
<td>8%</td>
<td>10%</td>
</tr>
</tbody>
</table>
I broke down the results for this question because there was some concern expressed in the literature review about the inclusiveness of consensus-based watershed organizations. A large majority of both groups, consensus and non-consensus, agreed that their watershed group was inclusive. As Table 6.16 above shows, the non-consensus group had 82 percent of its respondents agreeing with the statement that their group was inclusive. The consensus group was similarly high, with 72 percent of its respondents agreeing with the inclusiveness question.

The differences between consensus based respondents and non-consensus group members was analyzed statistically in the section on Consensus using a Mann-Whitney U test of rankings. This statistical test was conducted between two levels of consensus (consensus or non-consensus) and rankings of inclusiveness values. This Mann-Whitney U test of rankings was significant at the 0.10 level (p = 0.066) exhibiting less inclusiveness in consensus-based groups than non-consensus groups. This supports the literature that consensus-based groups can act to impede inclusiveness.

The differences seen in the table above for consensus (72 percent agree about inclusiveness) versus non-consensus (82 percent agree) were compared using a Chi-Square test that was barely insignificant (p = 0.141). The SPSS tables showing the results of this Chi-Square test can be seen in Appendix D. Original counts were used for the three categories because percentages are not allowed for Chi-Square tests. There appeared to be no difference between the inclusiveness scores for the consensus-only respondents and the non-consensus respondents as shown in this chart, which contradicts the earlier Mann-Whitney test of ranks. So while inclusiveness was high for both consensus and non-consensus respondents as the chart above shows, and not significantly different based on a Chi-Square test, an earlier statistical tests
(Mann-Whitney U) did show a significantly higher inclusiveness value (perceived) for the non-consensus based participants. The effect of consensus on inclusiveness shows mixed results, therefore, but due to the exploratory nature of this research it lends itself to further investigation.

What about the charge that few elected officials oversee or participate in watershed groups, and thus the public is not included in the process (because elected officials are seen as the public’s representative). The survey results here seem to show this to be the case, or at least that some significant split appears regarding this issue, as can be seen in Table 6.17 below. In fact, opinion seems to be split roughly down the middle with 39.2 percent of respondents agreeing with the statement that few elected officials participate in watershed groups, 45.1 percent disagreeing, and 15.7 percent choosing the neither agree nor disagree category. The high percentage of people who agree with this statement is very troublesome, because the question also states at the end that this lack of elected official participation “hinders the legitimacy of our efforts.” It appears that lack of representation by elected officials represents a serious setback for the legitimacy of the watershed organizations analyzed here. The Survey Monkey chart for the results on this question can be seen Appendix F.

Table 6.17 – “Few Elected Officials Participate in My Watershed Organization, which Hinders the Legitimacy of Our Efforts”

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Mostly Agree</th>
<th>Slightly Agree</th>
<th>Neither</th>
<th>Slightly Disagree</th>
<th>Mostly Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.9%</td>
<td>11.8%</td>
<td>23.5%</td>
<td>15.7%</td>
<td>3.9%</td>
<td>27.5%</td>
<td>13.7%</td>
</tr>
</tbody>
</table>

Because my survey respondents came from three different watersheds in several geographical areas and encompassed separate political boundaries, I investigated whether the
agreement for this negative statement was concentrated in only one of the three watersheds. I used Survey Monkey to filter answers according to watershed, and the results are shown in the three charts in Appendix F, as well as in the Table 6.18 below. As you can see from this table below, each watershed has a rough split between those that agree versus those that disagree that few elected officials participate in watershed groups. This tells me that the each of the three watershed groups suffers from a similar lack of representation from elected officials.

I conducted a Chi-Square test to see if there was a significant difference between the three watersheds regarding the responses to this question. In order to have the minimum number of observations per cell (5) I had to group the neither category in with the disagree respondents. Thus, the test was compared across the three watersheds and based on two dichotomous categories: (1) agreed that few elected officials participate, and (2) selected neither or a disagree category. The Chi-Square value for this test was 0.444 with a p-value of 0.801, far below the significance level of value of 0.10. The output results for this test can be seen in Appendix D for Test 13. Thus, I conclude there is no significant difference among the three watersheds regarding the perceived participation of elected officials.

<table>
<thead>
<tr>
<th>Table 6.18 - Percentage of Respondents in Each of Three Watersheds Who Agree that Few Elected Officials Participate in Watershed Organizations:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waterhed</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Rock River</td>
</tr>
<tr>
<td>SE Fox</td>
</tr>
<tr>
<td>Poplar Creek</td>
</tr>
</tbody>
</table>
What I do see here, however, is a large enough percentage of respondents in each watershed (35%, 50%, and 37% from the table below) who believe that few elected officials participate in watershed organizations, with the SE Fox exhibiting the biggest problem (50%) for this issue. This is a definite legitimacy problem considering that these officials constitute the only representative for many residents in the watershed, and could play an important role in the implementation of the planning groups’ recommendations.

Another way to gauge inclusiveness is to ask respondents how many different stakeholder groups are involved in the collaboration process. One question on the survey asked participants to select from a list all the stakeholder groups that are represented in their watershed group. The question read as follows, “Select all the groups that are represented in your watershed group, in a formal or informal capacity.” The respondents then were presented a list of 16 potential stakeholders to choose from. This list is shown below (Table 6.19). On this list I tried to include every possible stakeholder relevant to watershed collaborations. The number in parentheses is the number of people who picked that stakeholder group as one that they believed is represented in their watershed. So, again the results are based on the perceptions of the respondents.

Remember, the numbers in the parentheses shown above represent the number of survey respondents who claim that a particular stakeholder group is represented in the collaborative process. It is not the total number of stakeholders represented. I will refer to this number as “votes,” but realize that each vote represents one survey respondents’ recollection or perception of a particular stakeholder’s involvement in the process. As such, it represents proxy, perception-based measure of inclusiveness.
For the three watersheds studied here, you can see from the chart below that several stakeholders were very poorly “represented” in the watershed organizations. These were commercial livestock farmer (5 votes), commercial vegetable and/or fruit farmer (3 votes), commercial dairy farmer (6 votes), and national environmental interest (9 votes). Among these five, the first two are not too much of a concern since my watersheds were in southern Wisconsin and northern Illinois where few vegetable and livestock farmers are located anyway. But the lack of a representative from a national environmental group is a concern that was expressed in the literature with regards to resource management collaborations in general, and that appears to be the case here as well. While local environmental interests are often considered in watershed collaboration deliberations, national environmental interests get short shrift, most probably due

### Table 6.19– Votes for Each Stakeholder Group (Perception Stakeholder Group Represented) for All Respondents and Sorted by Watershed – “Select All Stakeholder Groups who are Represented in Your Stakeholder Group, in a Formal or Informal Capacity” - Total Votes for All Watersheds are in Parentheses

<table>
<thead>
<tr>
<th>All Respondents</th>
<th>Rock</th>
<th>SE Fox</th>
<th>Poplar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citizen-Local Environmental Group (46)</td>
<td>19</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Local Government Agency (45)</td>
<td>17</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>The General Public (45)</td>
<td>19</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Educational Institution (34)</td>
<td>14</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>State Government Agency (34)</td>
<td>11</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Federal Government Agency (16)</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Other Business Interest (16)</td>
<td>6</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Real Estate Developer (13)</td>
<td>4</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Industry Representative (11)</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Commercial Grain Farmer (9)</td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>National Environmental Group (9)</td>
<td>1</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Recreation Business Interest (7)</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Commercial Dairy Farmer (6)</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Commercial Livestock Farmer (4)</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other Agribusiness (3)</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Commercial Vegetable and/Fruit Farmer (2)</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
to a lack of salience for broader or geographically dispersed issues. That is why I also included a question on the survey that will be discussed later that deals with the consideration of impacts outside of the watershed.

Another problem is the poor representation on the part of dairy farmers (6 votes), commercial grain farmers (11 votes) and other agribusiness interests (3 votes). Much of the land area in the two larger basins in southern Wisconsin is devoted to agriculture. Unlike the vegetable and livestock farmers, one would expect good representation from dairy farmers, grain farmers, and other agribusiness interests in southern Wisconsin and northern Illinois. The absence of farmers was also discussed in one of my earlier focus groups. The reason most often mentioned in those focus groups was lack of time for farmers, who were presumably too busy to attend meetings, particularly at certain times of year.

The poor representation of farmers in Poplar Creek is not problematic because this is an urban watershed. However, only one respondent from the Poplar Creek watershed believed real estate groups were represented in the process (Table 6.19 above), underscoring a huge legitimacy problem considering the impact of development projects in the suburban Chicago area. Even the agricultural Rock River Basin got more votes for real estate representation (4) than Poplar Creek (1), and the mixed rural-urban watershed of SE Fox received 8 votes for this stakeholder group. So, while the agricultural watersheds of Rock River and the mixed watershed of SE Fox seem to suffer from a lack of farmer representation, the urban watershed of Poplar Creek appears threatened by its lack of real estate representation. Both of these situations are major legitimacy concerns for watershed collaborations that rely on inclusive participation of all major stakeholders.
Recreation business interests, another group one should commonly find in southern Wisconsin, received only 9 votes in this survey. Even federal government agencies received only 18 votes, which seems small compared to state (35 votes) and local (46 votes) government agencies. Along with state and local government, educational institutions are highly represented here with 36 votes. This is not surprising considering the influence and work of the University of Wisconsin Extension for my two Wisconsin watersheds. It is heartening to see that grassroots citizen/local environmental groups and the general public were well-represented, with 47 and 46 representatives, respectively.

Overall, the high amount of representation (votes) for all of the governmental agencies except for the federal government is expected and encouraging, as is the high involvement of educational institutions and grassroots/local environmental groups. During the focus groups, several people expressed concern over lack of farmer participation, and this is borne out in this survey especially with regards to dairy and grain farmers who are commonly found in this area of the United States. Some in the focus groups also expressed worry over lack of business participation in watershed collaborations -- but the 15, 17, and 46 votes that industry representatives received were at least higher than those received by dairy (6), livestock (5), vegetable/fruit (3) and grain farmers (11).

A Survey-Monkey chart of results from this question on perceived representation is shown below in Figure 6.1, but I should warn you that Survey Monkey assigns those categories receiving the lowest amount of votes get into the “other” category in this figure. This is why I created Table 6.19 above which gives a breakdown of all the numerous stakeholder groups. Figure 6.1 below illustrates the differences between groups well.
Figure 6.1 - List of Representatives in the Three Watersheds (Votes of 58 Respondents)

One negative aspect of inclusiveness discussed in the literature was the occasional interference with property rights that can coincide with a process that attempts to include and placate a large number of interests. For that reason, I included a question that addressed this potential problem. The question read as follows, “Landowners in my watershed see more inclusive participation in watershed partnerships as a threat to their property rights.” Opinion on this statement was pretty well split with 13 agreeing, 18 disagreeing, and 22 selecting the neither category. The large number of respondents who chose the neither category is interesting, and may indicate confusion, conflict, or ambivalence about property rights. The two Wisconsin
focus groups both mentioned the resentment that lakeside residents have toward the DNR, particularly regarding activities along the shoreline. Some people expressed outrage over DNR interference with property rights, whereas others were upset the DNR lacked the authority to limit certain activities that threaten water quality and aesthetics. The large split in opinion, along with the high number of people selecting the neither category certainly casts some doubt on this issue as a potential threat to legitimacy. The results for this question are summarized in a chart generated from Survey Monkey that can be seen in Appendix F.

2. **Representation**

The question that served to measure the quality of representation was question two in section three (3-2) and read, "The representatives in my watershed group effectively represent the interests of their constituents." The strongly agree and mostly agree selections in this question dominated, with 23 percent of respondents picking the former and 58 percent choosing the latter. If you add in another 9 percent who slightly agree with this statement, you get a total of 90 percent who agree to some extent that representation is good in their watersheds. The chart showing the results for quality representation is shown in Appendix F.

So, this element of legitimacy appears to come out strong based on the responses of people familiar with issues in the watershed. But there are other questions in the survey that cast doubts on the quality of representation for the three watershed organizations. One question asked respondents to rate their agreement with this statement, “The stakeholders in my watershed organization represent demographically diverse groups.” The chart showing the results for demographic diversity is shown in Appendix F. This question is similar to the one about
representation but phrases it differently, with the focus being on the “demographic diversity” rather than “interests.” Notice, that while the question on representation of interests had almost no disagreement (see the chart in Appendix F), this question on demographic diversity had 25 percent who disagreed with it to some degree. In addition, there were five people (9 percent) who selected the neither agree nor disagree category, which adds to the concerns surrounding the quality of demographic diversity in these watershed groups. It may be that respondents believe their watershed groups incorporate the key stakeholder groups or “interests” in the watershed, but may not necessarily include minorities and other underrepresented socioeconomic groups in the process. While some demographic groups may not be viewed as important “stakeholders” in the watershed, such a viewpoint could certainly threaten the legitimacy of watershed organizations.

The different results for the two questions discussed above are not surprising based on my focus group discussions. Many people admitted they worked with a relatively homogenous group of watershed participants (white, higher income, educated, professional), but defended their partnerships by stating that most interests and stakeholders were represented. So, for many of the focus group participants the demographic diversity issue was less important than the overall quality of representation of the varying stakeholders in the watershed. In addition, some focus group members pointed out that their watershed was mostly white and middle income anyway, and so a group heavily represented by middle-income whites should not be problematic. This was true to a large degree for the Wisconsin watersheds, but not for Poplar Creek in Illinois. Still, from a legitimacy perspective, the homogenous make-up of the watershed groups does seem problematic, even for Rock River and SE Fox. A final check of the representation of our watershed group survey participants was derived from a question that asked people to categorize
themselves into one of several stakeholder groups. In other words, they self-identify themselves regarding stakeholder type. However, not all of the survey respondents were watershed-group participants. Fortunately, there is a question in the survey that gives us the exact number. Question 11-8 asks the respondents, “Are you presently involved in the watershed group for your watershed?” It turned out that 35 out of 50 people who answered the question indicated they were watershed group participants. So, 70 percent of the people that answered this question were indeed watershed group participants.

Using Survey Monkey filtering capability, I was able to get the results from several demographic diversity questions for the watershed participant respondents (33 people) only. So, what was the exact demographic make-up of the survey respondents who were group participants? For this discussion, I will refer to an earlier table which I have copied to this location for ease of reference. Table 6.20 below shows the percentages for different demographic factors: race, gender, income, education, and residence type.

Let’s start with racial make-up. From this table below (Table 6.20), you can see that 91 percent of watershed participant respondents were white, 3 percent African-American, and 6 percent were “other.” None of the 33 respondents were Hispanic, Native American, or Asian, making this a very homogenous group with regards to race. A bar chart for this data can be seen in Appendix F.

What about gender? Here the make-up is not quite so homogenous, with 63 percent male and 37 percent female. Still, males do dominate the process. Remember, the results for this chart differ from the earlier charts because this one contains only 33 respondents who are active group participants, whereas the earlier chart contained all respondents. The chart in Appendix F shows the breakdown of watershed participants for gender.
Table 6.20 – Summary of Demographic Diversity: Percentage Breakdown for Watershed Group Participants (33 survey respondents) for Selected Demographic Factors

<table>
<thead>
<tr>
<th>Race</th>
<th>91% White</th>
<th>3% Black</th>
<th>6% Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>63% Male</td>
<td>37% Female</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>6% Under $19,999 per Year</td>
<td>10% Between $20,000 and $49,999 per Year</td>
<td>35% Between $50,000 and $74,999 per Year</td>
</tr>
<tr>
<td></td>
<td>23% Between $75,000 and $99,999 per Year</td>
<td>26% Over $100,000 per Year</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>17% Did Not Attend College or a Technical School</td>
<td>43% Graduated College, but no Further Education</td>
<td>40% Completed a Masters or PhD Program</td>
</tr>
<tr>
<td>Residence Type</td>
<td>23% Rural Area</td>
<td>37% Small Town</td>
<td>23% Small City</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17% Large City</td>
</tr>
</tbody>
</table>

What is the make-up according to income level for active watershed participants? Again, we see a fairly homogenous group of people, concentrated in the upper-middle income brackets. As the summary table above shows (Table 6.20), 94 percent of watershed group participants who answered this question (some respondents naturally did not answer this question) identified their income range as $50,000 or more. Only 5 people (6%) made less than $50,000. Income levels were concentrated in two categories: $50,000 to $74,999 which comprised 35 percent of all respondents, and $75,000 to $99,999, which contained 23 percent of respondents. More telling is the fact that more watershed group participants were in the $100,000 and over category (8), than in the under $50,000 category (5). No doubt, we are looking at mostly upper middle to upper income residents in this study. Lower income individuals are definitely lacking, with only 2 people earning $19,999 or less. The chart summarizing these income levels is in Appendix F.
How did our respondents stack up with regards to education levels? Again, we see a very homogenous group of highly educated people, as one would expect. From the summary table (Table 6.20) above you can see that only 17 percent of the respondents did not attend college or technical school. One person who did not attend college selected “no formal education” and certainly represents an anomaly with regards to this group of people. Amazingly, 43 percent of the respondents had a college degree, and another 45 percent had either a Master’s degree or a PhD. As was to be expected this was indeed a select and restricted group as far as educational attainment is concerned. The high amount of education present in the watershed group participants is good from a capacity building perspective, but problematic from the standpoint of legitimacy. This absence of demographic diversity could be very disconcerting in this regards, which was seen above in the comparison of all citizens versus survey respondents. A chart generated from Survey Monkey for these educational questions is in Appendix F.

Lastly, let’s look at the rural-urban breakdown of the respondents’ residence locations. One question in the survey asked respondents to choose their residence type based on several possibilities: rural (outside town limits), small village (less than 500 people), village (500 to 1499 people), small town (1500 to 2999 people), town (3000 to 19,999 people), small city (20,000 to 99,999), and large city (100,000 people or greater). The summary table (Table 6.26) shows a fairly even distribution of people according to the varying levels of urbanization. Although 23 percent of respondents live in a small city and 17 percent live in a large city, this is not unusual considering the typical concentration of people in urban areas in the United States. In addition, these urban residents seemed to be balanced relatively well by the 23 percent of residents who live in rural areas outside of town limits, as well as the 37 percent located in small villages or small towns. Residence location make-up was not stilted in favor of rural or urban,
with a goof mix of both for our survey respondents. Residence type was one demographic factor that was not weighted heavily one way or the other. The chart for residence type is in Appendix F.

Quality of representation can certainly be affected by the varying amounts of influence that some stakeholder groups wield, with some interests having more influence and power than others. This inequity in influence, based on different levels of power and resources, also relates to the legitimacy element of fairness and will be discussed further in the section on fairness. For now, we want to see which of the various stakeholders in our three watersheds have the most influence as determined by a question posed to the participants. The question read as follows, “Select up to 5 (or less, if applicable) of the most influential stakeholder groups represented in your watershed, in a formal or informal capacity. Please remember the top three for the next question.” So the respondents could choose up to five of the most influential stakeholder groups, but they did not have to choose that many if warranted. The list of possible stakeholder groups available for selection for this question is shown below (Table 6.21). As it turned out, only five of the listed stakeholder groups received any significant number of votes. For this question, we should go back to look at the results for the entire group of survey respondents. Looking at the list and chart below (Table 6.21), one can see that the five stakeholder groups that received the most votes regarding influence were the following: Grassroots Citizen or Local Environmental Group (40 votes), Local Governmental Agency (38 votes), State Governmental Agency (31 votes), Educational Institution (24), the General Public (24). A distant sixth place went to Federal Governmental Agency with nine votes. These results are what one would expect given the heavy influence of government in these watershed collaborations. The only exception is the
relatively small influence by federal government agencies, something I mentioned earlier regarding the number of stakeholders represented in the watershed.

Table 6.21 - Votes on the Top Five Most Influential Stakeholder Groups (52 Respondents)
Grassroots Citizen or Local Environmental Group (40)
Local Government Agency (38)
State Government Agency (31)
Educational Institution (24)
The General Public (24)
Federal Government Agency (9)
Real Estate Developer (8)
Other Business Interest (6)
Commercial Grain Farmer (5)
National Environmental Group (4)
Industry Representative (4)
Commercial Dairy Farmer (3)
Commercial Livestock Farmer (1)
Recreation Business Interest (1)
Commercial Vegetable and/Fruit Farmer (0)
Other Agribusiness (0)

National environmental groups also do not have much influence here, leading me to suspect a threat to legitimacy due to a lack of national perspective. Watershed collaborations are place-based organizations, and the category of local environmental groups/grassroots organizations may serve well to represent the general public regarding pollution and other issues. However, environmental problems cross watershed boundaries and many pollutants travel a long distance downstream, as well. For these reasons, it is imperative that national environmental and governmental interests be given strong consideration so the general public over a larger scale can be represented, as well.

Also, farmers are shown as having little influence, exhibiting another legitimacy related problem to watershed collaborations. Here we see that farmers only got a few votes regarding their overall influence within the watersheds. Even dairy farmers received only three votes.
Commercial farmers got only one vote, and both vegetable farmers and other agribusiness got no votes. This is disturbing considering that farmland typically occupies a large percentage of the overall area of most Midwestern watersheds. Again, this was reinforced with the comments from the focus groups where lack of farmer participation was specifically addressed. Some focus-group respondents stated that many farmers are too busy to become involved in watershed collaborations and the timing of the meetings in the evenings further works against their participation. It may be that farmers tend not to bother dealing with organizations that have little regulatory teeth, which would describe most watershed collaborations. This would provide an explanation for lack of farmer involvement that would only exacerbate the legitimacy problem. Also, farmers may be exerting their influence on land-use decisions in our arenas, which may account for their absence in collaborative groups. These are possible reasons for poor farmer participation, and warrant further research. Still, if these groups are to attain any level of legitimacy, and hence effectiveness, it seems important that farmers buy into this process. Acquiring such farmer participation in rural watersheds would seem to be a primary goal of watershed groups.

Finally, I would say these results are similar to the ones for the question that asks respondents to list all stakeholders in their watershed that have some type of formal or informal representation. A Survey Monkey chart (Figure 6.2) of the top five most influential stakeholder groups follows below, with the lowest frequency categories grouped into “other.”
What about the results for the question on the top three most influential stakeholders? Do these results allow us to narrow down the most influential stakeholder groups from the top five? What we find is that four out of five of the stakeholder groups that were rated in the top five also got a large percentage of votes for respondents rating their top three most influential stakeholders. Local Governmental Agency, Grassroots Citizen or Local Environmental Group, State Governmental Agency, and the General Public all ranked high for 1st, 2nd, or 3rd place votes for most influential stakeholder groups (the question had survey respondents rank the top three most influential stakeholders). The one that fell off quite a bit was educational institutions, as the list (Table 6.22) and the Survey Monkey chart below (Figure 6.3) illustrate.

Figure 6.2 - The Five Most Influential Stakeholder Groups (52 Respondents)
Table 6.22 - Votes on the Top Three Most Influential Stakeholder Groups (52 Respondents)
Local Government Agency (37)
Grassroots Citizen or Local Environmental Group (31)
The General Public (26)
Educational Institution (7)
Federal Government Agency (7)
Real Estate Developer (5)
Other Business Interest (5)
National Environmental Group (2)
Commercial Grain Farmer (2)
Commercial Dairy Farmer (1)
Other Agribusiness (1)
Industry Representative (1)
Commercial Vegetable and/Fruit Farmer (0)
Commercial Livestock Farmer (0)
Recreation Business Interest (0)

The third list seen below in Table 6.23 shows how many first place votes each stakeholder group received from the survey respondents. As you can see, local government was the clear winner with 19 first place votes out of 52, an impressive number. State government and grassroots citizen or local environmental groups were tied for second place with 9 votes each. The general public was close behind with 8 votes. Educational institutions received only 2 first place votes, which is further proof of how this stakeholder group’s influence drops off upon further questioning. Federal government received three first place votes, as well, and again we see the waning influence of national interests. Another national interest group, environmental organizations based outside the local area, received no first place votes.
Again, we see a legitimacy problem related to national interests with the results from these two stakeholder groups. Finally, the legitimacy problem related to the paucity of farmer involvement gets reinforced when we see that no farmer group got a single vote. As a matter of fact, the only commercial interest group that received any first place votes was real estate developer, with two votes. The two votes for real estate developer came from the SE Fox Watershed, which has more suburban development than the predominately agricultural Rock River Basin, but less than the Poplar Creek watershed in the suburban Chicago. Overall, however, commercial and business interests -- agricultural or otherwise -- seemed to have very little influence within watershed collaborations.
Table 6.23 - Votes on the Single Most Influential Stakeholder Group (52 Respondents)
Local Government Agency (19)
State Government Agency (9)
Grassroots Citizen or Local Environmental Group (9)
The General Public (8)
Federal Government Agency (3)
Educational Institution (2)
Real Estate Developer (2)
National Environmental Group (0)
Commercial Grain Farmer (0)
Commercial Vegetable and/Fruit Farmer (0)
Commercial Livestock Farmer (0)
Commercial Dairy Farmer (0)
Other Agribusiness (0)
Recreation Business Interest (0)
Industry Representative (0)
Other Business Interest (0)

It is important to note throughout this discussion that questions such as these on the influence of stakeholders, as well as the legitimacy of the collaborative groups, is based on the perception of the survey respondents, most of whom are present or former group participants. As such, they may indeed distort the actual legitimacy, influence, and effectiveness of collaborative groups, as they see watershed outcomes and processes through their own biased eyes. The respondents may be telling each other (as well as me, via this survey) that the watershed groups are more influential and effective than may be the case in reality. This is one of the inherent drawbacks to this study. A lack of legitimacy or influence as seen by these respondents may not be accurate due to their positive bias. On the other hand, any problems that are uncovered from this survey certainly are cause for concern considering the survey respondents’ positive bias. Uncovering potential problems related to legitimacy is a major goal of this research.
3. **Transparency**

Included in the concept of information exchange is transparency. Literature research showed a strong call for an open and transparent process for watershed collaborations. How well does transparency hold up according to our survey respondents in the three watersheds? Very well, if you go by the results of a question that asked participants to rate their agreement to the following statement, “The partnership activities in my watershed are open and transparent to the point whereby all citizens are able to find out what is occurring in the watershed.” Out of a total of 52 people who answered this question, 85 percent agreed with this statement, with the mostly agree category holding 40 of that 85 percent. The percentage of people who strongly agreed with this statement stood at 19 percent, which is a relatively high percentage for this category compared to other questions analyzed so far. Exactly one-half of these strongly positive responders came from the Rock River Basin, with the other half split between Poplar Creek and SE Fox. Considering the strong outreach program in the Rock River, this does not come as a surprise. The neither category was represented by 8 percent, 6 percent chose slightly disagree, and 12 percent (1 person) selected the mostly disagree category. These results can be seen in a bar column chart in Appendix F.

4. **Fairness**

The question that served to measure fairness was question nine in section three (3-9) and read, "Those with greater resources (money, time, power, influence) participate in my watershed group to a larger extent than those with fewer resources." Unlike the other questions, this
question actually represents the opposite of legitimacy, because when participation is stilted
towards toward those with more money, power or resources, an unfair situation results. So, the
more a respondent agrees with this statement the less legitimacy exists for this element of
fairness. Therefore, I did not reverse the coding like I did for the other Likert responses. For the
graph below, one should read it differently than the others and note that high levels of
disagreement illustrate high levels of legitimacy.

The results were roughly evenly divided between those that agree and those that disagree
with this statement of unfairness. Out of a total of 52 respondents, 38 percent agreed with the
idea that participation was unfairly stilted towards those with more power and resources, whereas
33 percent disagreed with the statement. Interestingly, 29 percent neither agreed nor disagreed
with the statement. These results, including the high number of undecided people show a high
degree of contention regarding the concept of fairness, indicating a potential problem for overall
legitimacy. It should be noted that this question tested for the fairness of the process, and that is
why it focused on participation. There are other questions in the survey that dealt with fairness
of outcome, and those will be discussed in a later section on just and equitable outcomes. In any
case, there is plenty of doubt (split opinion) for this question to warrant serious concern about
fairness of process and its negative impact on overall watershed legitimacy. A chart for these
results can be found in Appendix F.

5. Trust

If one studies the literature on watershed collaborations it becomes apparent quickly that
trust, or more importantly lack of trust, is a big issue for the success of these types of groups.
Trust is difficult and time-consuming to attain, yet can be destroyed fairly quickly. There was a fair amount of talk regarding distrust in the focus groups, and many focus group participants claimed they worked diligently to regain some of that lost trust. For this reason, I was very interested in the results of two questions from the survey that dealt with trust. The first question was used in the calculation of the legitimacy index and read as follows, “There is a high level of trust between stakeholders in my watershed.” Out of a total 50 respondents who answered this question, 66 percent of them agreed in some capacity that the level of trust was high. The mostly agreed category contained 38 percent of the total number of respondents. Another 20 percent picked slightly agree and 8 percent chose strongly agree. These results were better than I expected based on the focus groups, but still appeared to be a problem. The results showed 20 percent (10 people) of respondents disagreed with this statement, even though 12 percent of those chose slightly agree and 8 percent selected the slightly disagree category. An additional problem occurred when another 14 percent (7 people) selected the neither category, illustrating a lack of certainty over trust in the watershed.

So, based on these results I would conclude that lack of trust is still problematic for watershed collaborations for our three groups, despite the best efforts of many of the watershed group participants. This is not a surprise given the literature that indicated that regaining lost trust can be very difficult. Prior distrust in the watersheds makes the task for the watershed partnerships that much more difficult. The bar chart summarizing the results for trust results can be seen in Appendix F.

Was the lack of trust concentrated in one watershed versus the other three? I was particularly interested in the results for one watershed in particular (Rock River), where focus group discussion had focused on distrust toward the Wisconsin DNR. The focus group for the
Rock River was the one where residents said things like, “You guys (DNR) screwed me!” and “I won’t talk to you because you get money from the DNR.”

Filtering responses according to watershed we get the results seen in the three charts below. Rock River did indeed seem to show the most distrust because 37 percent of its 19 respondents selected some form of disagreement with the trust statement. For the SE Fox watershed, only 16 percent (2 people) disagreed with the trust statement, but that was out of a lower total of 12 people. The Poplar Creek watershed also only had one person out of 18 that selected a disagree category, which represented 6 percent of the total. However, unlike Rock River and SE Fox (where nobody selected neither) 39 percent chose the neither category in the Poplar Creek watershed. Looking at these results it appears that the Rock River did have more distrust in its watershed. However, if you include the undecided or conflicted respondents (the neither category) in the other two watersheds, the differences may not be as significant.

I ran a Chi-Square test using two categories: agree or not agree. In the disagree category I included both disagree and neither selections from the Likert question. I did this for two reasons. One, Chi-Square requires a minimum of 5 observations per cell, and if I had three categories of agreement (agree, neither, disagree) I would only have two cells with zero observations, and two more with only two counts. For a two-by-two test (agree versus disagree or neither) I would be under 5 for only one cell, and no cell would have zero counts (see chart below). Second, I believe that a selection of neither on a question about trust is an indicator of trouble due to doubt that exists in the minds of the respondent. A selection of neither is a negative answer which can be grouped with other negative answers (disagree), and compared against the positive answers (agree). The two-by-two table for the Chi-Square test is shown below (Table 6.24). The test resulted in a Chi-Square value of 2.515 that was insignificant at the 0.10 level. Therefore, the
test actually shows no significant difference among the watersheds regarding trust. However, the large number of disagree selections, combined with neither selections for this question is disturbing, and is evidence for additional research. The SPSS output results for this test can be seen in Appendix D.

Table 6.24 - Chi-Square Table: Frequency Count - Trust versus Watersheds

<table>
<thead>
<tr>
<th></th>
<th>Agree – High Level of Trust</th>
<th>Neither or Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock River</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>SE Fox</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Poplar Creek</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

Chi-Square Value = 2.515
Significance Level = 0.28 Test Insignificant at the 0.10 level

Considering the great deal of effort expended by watershed participants on increasing trust in their watersheds as discussed in the focus groups, I decided to add a question regarding changes in trust over time. The question posed to respondents read as follows, “The level of trust between different stakeholders has improved since the inception of my watershed group.” Out of a total of 49 respondents who answered this question, 10 percent strongly agreed, 33 percent mostly agreed, and 16 percent slightly agreed with the statement that trust levels have increased over time as a result of watershed partnership activities. This total of 29 people who agreed with the statement was countered by only three people, or 6 percent, who disagree with the statement and do not believe trust levels have improved over time. However, the red flag here is 35 percent (17 people) who selected the neither agree nor disagree category. This definitely
indicates some dissent within the group of survey respondents regarding increasing amounts of trust. This is an important indicator of the success of watershed collaborations; it is a very discouraging sign if the partnership deliberations between various stakeholders are not even increasing trust over time, no matter how badly damaged that trust level was in the beginning. Remember, 35 of these respondents are watershed group participants, and they should naturally have a bias towards the positive aspects of their activities. If a large number of these people have doubts about increasing trust levels, then this presents a large problem for the legitimacy of such watershed partnerships. The chart showing the increase of trust over time can be found in Appendix F.

I also wanted to see if there was some relationship between trust-building over time and consensus. As will be discussed further in the section on consensus, some critics contend that consensus decision-making takes too much time and leads to the self-exclusion of certain stakeholders, often those who become impatient with the time-consuming nature of the process. However, what are some of the benefits of such time consuming consensus-building? Trust may be increased because all stakeholders are given great respect and outcomes are embraced by all. To see if consensus may build trust among stakeholders in this way, I filtered the survey results on level of trust according to consensus and non-consensus respondents.

For 22 people in consensus groups, 23 percent picked the neither category, with another 4.5 percent (1 person) disagreeing with the statement that trust had increased over time. These 6 people who did not believe trust increased over time represent 27 percent of the total, and thus there still is a legitimacy problem even for consensus-based groups. The results were worse for the non-consensus groups, however, with 44 percent (27 people) choosing the neither category. In this same non-consensus group, another 7 percent (2 people) disagreed with the question and
believed trust had not increased over time. So, both consensus and non-consensus groups had a significant minority that did not necessarily agree that trust levels were high in their watersheds.

A Chi-Square test was run against consensus, with two levels of trust and two levels of consensus. The Chi-Square value was 0.681 which was insignificant at the 0.10 level. Even though more consensus respondents agreed that trust was high in their watershed than the non-consensus group, the difference was not statistically significant. The results of this test can be seen in Table 6.25 below.

Table 6.25 - Chi-Square Table: Frequency Counts - Trust versus Consensus

<table>
<thead>
<tr>
<th></th>
<th>Consensus Respondents Agree</th>
<th>Non-Consensus Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree – High Level of Trust</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>Disagree or Neither</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

Chi-Square Value = 0.681

Significance level = 0.409

Test Insignificant at the 0.10 level

6. Accountability

The question that served to measure accountability was question three in section six (6-3) and read, "Stakeholders who do not comply with the watershed organization's plans and/or recommendations are generally held accountable by some government entity for their action or
inaction in my watershed." Like fairness, survey results show problems with this element of legitimacy because the results were divided between those agreeing with the statement and those disagreeing. Although 31 percent of respondents agreed with the statement that some accountability measures were in place, a larger group comprising 49 percent of the total disagreed. Like the question on fairness, there were a large number of respondents who were indecisive, with 20 percent people choosing "neither agree nor disagree" The possibility exists for both the question on fairness and accountability that the high number of indecisive respondents is due a reluctance on the part of those highly vested in watershed collaborations to criticize their organizations. The large number of undecided respondents could also be a result of a perception by many that there is no effective and measurable way for accountability to be obtained. At any rate, these undecided (selected neither) respondents combined with the negative selections indicate possible threats to legitimacy regarding fairness and accountability. This could be related to the same lack of accountability that was brought up during of one of the focus groups. A chart for these results on accountability can be seen in Appendix F.

Accountability is one of many elements of legitimacy that overlaps with other elements. In this case, accountability overlaps with trust in that you need less of the former when you have more trust. Transparency also overlaps because this element is a form of accountability. But formal accountability to some entity as phrased in the question is closely linked to the role of government, which is another topic related to watershed collaboration and will be discussed later on in this paper. Role of government is relevant to accountability, because government often act as the entity that collaborations look to for accountability. The exact nature of government-based accountability brings up all sorts of questions that need to be addressed. Governmental agencies could also play a role in enforcement of some aspects of watershed plans. Given the results of the
survey on this question, it is apparent that further research and analysis of accountability is needed considering the importance of this element of legitimacy. A lack of accountability mostly threatens the outcome part of legitimacy, rather than process -- because fair outcomes, justice, and equity can be compromised if accountability is not enforced. In addition, if efforts are not sustained over the long-term, and plans are not followed (as was discussed in the Poplar Creek focus groups), the entire existence and usefulness of watershed collaborations comes into question.

7. **Consensus**

Even though consensus is one of my 12 elements of legitimacy as determined from the literature review, I decided not to use it in the calculation of the legitimacy index. That is because many of my respondents were working in watershed groups that did not utilize consensus as their primary model of decision-making. This was determined from a question that asked respondents to select one of three decision-making models for their partnership: hierarchical, democratic (voting), or consensus. Only those respondents that picked the last option were forwarded to questions that asked them to rate the level of consensus in their group. These people were also asked a few more questions related to consensus. The non-consensus respondents were forwarded to the rest of the survey and were skipped around further questions on consensus. From a total of 49 respondents, 45 percent (22) chose consensus as their primary mode of decision-making within their watershed. The others were split between hierarchical (12 percent) and democratic (43 percent). The chart showing this breakdown according to three categories is shown in Appendix F.
I wanted to develop the legitimacy index based on the input of as many survey respondents as possible, and therefore decided to remove consensus as one of the determining elements rather than ignore the opinions of 27 respondents, which would have left me with less than half of my original number of completed questionnaires. Because I wanted to compare the legitimacy indices for the various respondents based on similar elements (questions), I therefore decided to remove consensus from the measurement known as the legitimacy index. I could then use the ratings of all 49 respondents who completed every question dealing with legitimacy elements. Besides, the literature review found that consensus was one element where much disagreement existed as to its relevance to overall legitimacy, and some critiques even questioned its usefulness and desirability. Therefore, I was comfortable in deleting it from my overall legitimacy index.

However, I did want to examine some of the issues surrounding consensus and that is why I had the 22 consensus respondents (using Survey Monkey to identify these 22 people) answer some additional questions on this topic. These questions dealt with the exclusion of stakeholders and the avoidance of contentious issues in the watershed, both specifically and with regards to consensus. Earlier in this paper, I examined some other issues related to consensus -- including its effect for concerns of impacts outside of the watershed, the desire to address all critical issues, and concern for environmental issues -- both national and local. No relationship was found between these issues and consensus. The literature review showed negative impacts of consensus on these issues, but the results here did not support those ideas.

Inclusiveness was a different matter, however. One Mann-Whitney U test comparing consensus and inclusiveness was significant at the 0.10 level, and another Chi-Square test just
barely insignificant with a probability of 0.141. Due to these test results, I decided that further investigation of the results of the questions dealing with exclusion of stakeholders was necessary.

Some interesting findings did occur as a result of these questions. Before answering questions on exclusion and contentious issues, the 22 respondents were asked to rank their group's need or preference for consensus according to 4 levels: (1) Very strong need for consensus, (2) Strong need for consensus, (3) Moderate need for consensus, and (4) Slight preference for consensus. As the chart in Appendix F illustrates, 23 percent said their group had a very strong need for consensus, 50 percent indicated a strong need for consensus, 27 percent showed a moderate need for consensus, and 0 picked only a slight preference for consensus. So, of those respondents whose groups rely on consensus, the need for this decision-making model seemed fairly strong.

The results of these consensus-related questions are discussed below and involve three potential problems related to exclusion and avoidance of issues: (1) excluding certain "difficult" stakeholders, (2) self-exclusion of stakeholders who become impatience with the consensus decision-making model, and (3) the avoidance of contentious issues due to a high degree of deference to consensus.

The first question presented to the 22 consensus respondents dealt with the potential exclusion of stakeholders based on their perceived likeliness to go along with others in the group. The questions asked the respondents to select their level of agreement with this question, "The consensus model of decision-making used within our watershed often leads to the exclusion of certain stakeholders because they are perceived as being difficult." A 7-point Likert scale was used for possible responses: strongly agree, mostly agree, slightly agree, neither agree nor disagree, slightly disagree, mostly disagree, and strongly disagree.
There was more disagreement than agreement with this statement, with 64 percent of the respondents (14 people) selecting one of the disagree categories. The five people who did agree with the statement represented 23 percent of the total, and the other 13 percent (3 people) selected the neither category. So despite being in the minority, the 36 percent who agreed with this statement or wavered (chose neither), represent a large enough group to indicate inclusiveness could indeed be a problem for these watershed organizations. A chart of these results can be seen in Appendix F.

The second exclusion issue is less of a threat to legitimacy because it relates to self-exclusion, rather than purposeful exclusion of stakeholders who are deemed “difficult.” Self-exclusion still poses its own problems for inclusive participation, which is so often cited as a necessary requirement for legitimacy. The question that tested this problem asked respondents about their level of agreement with the following statement, “The consensus model of decision-making often leads to the self-exclusion of certain stakeholders who become impatient with the time-consuming nature of the process.” For this question there emerged a greater degree of threat to legitimacy, due to a higher level of agreement with the statement.

Over half of the respondents, 59 percent, agreed with this statement, but most of those, 36 percent of the total, selected the slightly agree category. Also important to note is that only 23 percent (5 people) disagreed with the statement, and another 18 percent (4 people) selected the neither option. Clearly, self-exclusion of some stakeholders was a problem in watersheds utilizing consensus as the main mode of decision-making. This is not a surprise considering some of the comments made in the focus groups, and these survey results reinforce the idea that self-exclusion was a major issue of concern surrounding consensus in the three watersheds studied here. The chart of results is shown in Appendix F.
Another potential problem investigated with regards to consensus was the notion that some controversial issues are avoided in order to make the attainment of consensus easier. As indicated in the literature review, some critics contend that consensus leads to the avoidance of contentious issues even when these are important issues that need to be dealt with in the watershed. This has been called “the least common denominator” effect by several critics (Coglianese 2001), and if present it represents a serious problem for the legitimacy of watershed collaborations. The respondents in this survey gave their Likert agreement or disagreement to the question, “The consensus model of decision-making used within our watershed often results in the avoidance of contentious or controversial issues.” Like the issue of self-exclusion discussed above, survey results showed this to be a problem with consensus. Exactly half of the respondents, 11 out 22, agreed with the statement that contentious issues were being avoided. Results showed 41 percent of all consensus respondents (9 people) selected the slightly agree category, with the other 9 percent (2 people) picking mostly agree. Considering the addition of 14 percent (3 people) who selected neither, the avoidance of issues appears to be a major drawback to watershed collaborations for the respondents utilizing consensus. A chart of the results for this question is shown below (Figure 6.4).

Another question in the survey essentially phrases this same issue in an opposite way. Instead of asking if contentious issues are avoided, the question asks if all issues, including the contentious ones, are always addressed. This question in essence acts as a check for the one above and is worded as follows, “The most important issues in my watershed, no matter how contentious, are always addressed by my watershed organization.” The Likert responses to this are shown in the chart below (Figure 6.5). When you compare the results of this question to the opposite question from above, it is interesting and somewhat disconcerting that the results do not
match. In the earlier question above, 11 out of 22 consensus-group respondents agreed that contentious or controversial questions were often avoided. You would expect those same 11 people to disagree with the opposite statement that ALL issues in the watershed, “no matter how contentious, are always addressed.” Yet, only 3 people, about 14 percent, disagreed with this statement, and these are from the same group of 22 respondents who work within consensus-based groups. It is possible that because the first question used the word “often” it is less specific than the second question, which uses the word “always.” This difference in specificity may account for the contrasting results. The charts from Survey Monkey that shows these conflicting results for the two questions are shown below (Figure 6.4 and Figure 6.5).

Regarding the discrepancy seen in the two charts below, there is always the possibility of a bias towards the agreement categories for each statement. However, I did not detect any bias towards the agreement side of the Likert Scale on the other questions in the survey. Earlier I did a Chi-Square test of comparison for consensus versus non-consensus respondents regarding the idea that all important issues are addressed in the watershed, and the results came up insignificant with a probability value of 0.323. For both consensus and non-consensus respondents, the results were mostly positive for this question versus the results on the first question (contentious issues are often avoided). These mixed results show a definite concern about whether all issues are being addressed within consensus-based groups, indicating a weakness for legitimacy.
Figure 6.4 - Avoidance of Contentious Issues in Consensus-Based Groups (22 Consensus Respondents Only)

Figure 6.5 - The Most Important Issues Are Always Addressed (22 Consensus Respondents Only)
Regarding the topic of consensus-based groups and the issues addressed via watershed collaboration, what other problems might exist? Besides inclusiveness and the avoidance of contentious issues, other problems mentioned in the literature focused on concern for impacts outside of the environment, -- including downstream issues --and avoidance of national environmental issues on a larger scale. These two are interconnected, and are being investigated based on the possibility that gaining consensus on issues outside of the immediate area of concern could be very difficult to achieve. However, as the statistical tests run earlier show, there is no difference between the consensus and non-consensus respondents on questions dealing with concern for issues outside of the watershed or national environmental problems. It should be noted here that for all respondents the concern for these larger scale issues was very high, which surprised me. Out of 55 respondents, 84 percent agreed with the statement, “My watershed organization should consider impacts that may occur outside of the watershed, in adjacent basins, as well as downstream.”

On the question that dealt with environmental issues, 98 percent of respondents (54 out of 55) agreed that “Local environmental issues and concerns are considered important in the deliberation process in my watershed group.” Nobody disagreed with this statement, because the other respondent picked neither.

For national environmental issues the agreement for action was not as high, but still very strong, as 65 percent of all respondents agreed that, “National environmental issues and concerns are considered important in the deliberation process in my watershed group.” Only 9 percent of the respondents disagreed with this statement, as the other 26 percent selected the neither category. The greater concern for local environmental issues than those on a national scale is to be expected given the place-based nature of the watershed collaborative groups, but does present
a potential legitimacy problem due to the interconnections between watersheds. The chart of results for these questions on environmental concerns and concerns outside of the watershed can be seen in Appendix F.

There were three more questions in the survey that dealt with issues to be addressed. First, respondents were asked to rank their top six issues in the watershed, based on a selection of 11. A follow-up question asked them to choose their top three issues in their watershed from the six they selected earlier. A third question asked if their top three issues were indeed being addressed in their watershed group. Again, we can break those results down into consensus group respondents versus those for all respondents (including hierarchical and democratic). This question, unlike most of the other questions which were Likert type, was a yes or no question. Of the 22 respondents who were in consensus-based groups, 86 percent agreed that their top 3 issues were being addressed. This compares to the non-consensus group of 27 respondents which had a lower, but still high, figure of 67 percent who believed their top three issues were being addressed. Actually, these results show the opposite of what we might expect based on past critiques of consensus. These results lend some credence to those who argue that watershed collaborations do indeed deal with all issues. However, it should be noted that we do not know from these results if the issues of interest to the respondents here are necessarily the most contentious ones in their watersheds. In addition, the most relevant and important issues in the watershed could also have been ignored. We only know the respondents are having their particular issues of concern dealt with. Appendix F contains the charts for the consensus-based groups and non-consensus groups regarding these questions.

In conclusion, these survey results do not show any difference between consensus groups and non-consensus groups with regards to the desire to tackle the most difficult issues in the
watershed. If anything, it seems that the consensus groups are no worse in attacking controversial and conflict-ridden issues, and possibly a bit better. However, the results do show some problems for ALL respondents, including the consensus-based ones. The three problems for all respondents were the self-exclusion of stakeholders, a lack of willingness to deal with national environmental issues, and the avoidance of contentious issues.

Self-exclusion of certain stakeholders greatly impedes any efforts at inclusiveness, and numerous other studies in the literature stress the need for inclusive representation in these voluntary groups. A lack of will to deal with national environmental issues is also problematic from a legitimacy perspective, due to the complex and interconnected nature of the problems that these watershed groups were formed to attack. Remember from the introduction of this work that these watershed groups are part of a new paradigm for solving the complex and pervasive problem of non-point source pollution, a type of pollution that has impacts far and wide from its original source region. If national environmental problems are not addressed here, then the very reason for the existence of these watershed organizations can be reasonably questioned. Finally, the idea that the most contentious issues are not being addressed is a very bad harbinger of chances for future success in these watersheds. Achieving progress in efforts to solve smaller and less difficult problems may help develop momentum for these groups in the beginning, but cannot be their main outcomes. If more difficult issues are not dealt with the overall success of these groups would have to be rated a failure. Finally, there were contradictory results regarding the avoidance of issues, with the respondents indicating their concern for it when worded as the avoidance of issues, but being less worried when the question was phrased if all issues were being addressed. Still, even contradictory results like this should be a warning that avoidance of contentious issues could very well be a threat to the legitimacy of watershed groups.
8. Public Participation

Another element of legitimacy is public participation, an extension of the concept of inclusiveness. During my literature search I came across many writers who called for greater public participation in natural resource collaborations. One question that was used for the calculation of the legitimacy index dealt with public participation and stated, “Watershed partnerships activities in my watershed are open to all residents who have a desire to become involved, including the public.” Of the 51 respondents who answered this question, 88 percent agreed with this statement, whereas only 6 percent disagreed and another 6 percent (3 people) selected the neither agree nor disagree option. Thus, this legitimacy element did not appear to be a problem based on the large percentage of people who felt that the public had an opportunity to become involved. The chart of results for public participation is shown in Appendix F.

It should be noted, however, that actual participation by the public is a different matter, with watershed participation typically weighted to those with higher incomes and education or those working in fields related to water resource management. A comparison of the demographic make-up of the watershed groups versus the residents of the watershed was described earlier. The focus group members admitted problems with broadening their base of participation, but they all insisted that their organizations worked hard to recruit people in the watershed from all segments of society. It seems to me that the focus group discussions and survey results for this question (“open” to all residents) were positive regarding efforts to illicit participation from a wider demographic, but in the end the collaborative groups tended to be heavily stilted toward higher income and educated individuals, many of whom had a professional interest in water
quality and land use control. As mentioned several times already, this appears to be the nature of volunteer based groups such as these watershed partnerships.

9. Just Outcomes

As discussed earlier, legitimacy can be broken down into process and outcome. Much of the focus so far has been on process, but a just and equitable outcome was identified in the literature as a key component of the legitimacy of watershed collaborations. The question used for calculating the legitimacy index was phrased as follows, “The outcomes (recommendations and/or plans) resulting from watershed partnership deliberations are just and equitable for all interests in the watershed.” A total of 51 people in the survey answered this question, and 82 percent agreed with this statement to some degree and felt the outcomes in their watersheds were just for all. Most of these (65%) fell into the mostly agree category, enforcing the strength of this legitimacy element. Of the 9 others who did not select agree (18%), only 1 person selected disagree (2 percent), and even that choice was for slightly disagree. The other 8 people, or 16 percent of the total, selected the neither category. The chart for these results is shown in Appendix F.

In order to give due diligence to this other side of legitimacy, I placed several more outcome related questions into the survey. A second question dealt with improvements in the well-being of all residents. Survey respondents were asked to select their Likert agreement with the following question, “The plans and/or recommendations implemented as result of watershed group deliberations increase the well-being of residents in the area.” Only one of the 51 people who answered this question disagreed with it, with 3 selecting the neither category, for a total of
only 8 percent. In addition, of the 92 percent (47 people) who agreed with this statement, the agreement tended toward the strong side with 41 percent selecting mostly agree and another 41 percent selecting strongly agree. Like the earlier question discussed above, the results from this question bode well for the perceived legitimacy of outcomes in the watersheds studied here. Of course, this survey question may have yielded quite different results if asked of all residents in the watershed, instead of just group of respondents. The chart of results for this question can be seen in Appendix F.

Another question addressed the outcomes for residents in the watershed who may not be represented in the process. It asked respondents to rank their agreement with the following, “Watershed partnership outcomes (plans and/or recommendations) generally benefit all residents in the watershed, whether they are represented in the planning process or not.” Again there was no disagreement, and strong agreement on the part of the 51 people who answered this question. There were only two people who selected the neither category, which was only 4 percent of all respondents. The largest category was mostly agree, which contained 67 percent of the total (34 people). Another 24 percent (12 people) strongly agreed that residents not represented in the process still receive benefits, and the final 4 percent (3 people) slightly agreed with this statement. A chart summarizing the results for this question can be seen in Appendix F.

Finally, there was a question that targeted the fairness of outcomes are for resource owners and users. This statement read as, “The outcomes in my watershed are fair in the treatment of resource owners and users.” Slightly more disagreement existed for this question than the others, with 1 person selecting slightly disagree, and 1 selecting mostly disagree. These two people represent 4 percent of the total, and another 4 percent (2 people) chose the neither category. The most popular agree category was mostly agree, which contained 51 percent of the
total (26 respondents). Just like the other questions on outcome, a total of 51 people responded, and 49 selected some form of agreement. As far as the issue of just outcomes is concerned, the survey results were very positive for our group of respondents. Just outcomes did not appear to be problematic from a legitimacy perspective, at least based on the perceptions of the survey respondents within the three watersheds studied here. There was also very little difference between the watersheds regarding these results. Only 5 percent of Poplar Creek respondents selected the neither category for all four outcome based questions, and none selected disagree. For the SE Fox watershed 8.3 percent of respondents (1 person) selected disagree for the two questions regarding fair outcomes for resource owners and users and just and equitable outcomes. For the other two questions on outcomes all respondents in the SE Fox watershed agreed with positive outcomes. For the Rock River Basin, only 5 percent of the respondents selected neither for three questions, another 5 percent disagreed, and for the one question on just and equitable outcomes, 25 percent selected disagreed. So, except for the stronger disagreement regarding just and equitable outcomes in the Rock River Basin, all watershed groups had similar positive results. If the same question regarding fair treatment was asked to the actual landowners and users of the resources, there is no telling how the results might have changed, but these results are positive from a legitimacy perspective. The chart illustrating the breakdown for this question can be seen in Appendix F.

10. Information Exchange

Another element of legitimacy dealt with the importance of information exchange, particularly the need for all stakeholders in the watershed to have fair and equal access to relative
information. The question used for the legitimacy index calculation was question two in section three (3-2) of the survey, and was worded as follows, “Because all stakeholders, including the public, have access to information regarding group activities, the understanding of watershed processes and problems is enhanced.” There was strong agreement with this statement, as 88 percent (44 people) out of 50 respondents chose some form of agreement. The most popular option was mostly agree, with 40 percent (26 people) picking that category. Only four people, or 8 percent, chose a disagree category and all four of those selected slightly disagree. Another 4 percent (2 people) chose the neither category. Information exchange did not appear to be a threat to legitimacy within our three watersheds based on the results of this survey. A chart summarizing these results is shown in Appendix F.

A closely related question that was not used for the legitimacy index calculation was worded a bit differently. It read, “Information exchange between stakeholders and scientists in my watershed is effective in enhancing understanding of watershed processes and problems.” Notice its wording is very close to the earlier question, but it specifically refers to scientists and stakeholders in the watershed, rather than the public. The results were very close to the other question as there was 90 percent agreement, and only 10 percent (5 people) did not select some form of agreement. Of that 10 percent, 6 percent (3 people) chose neither and only 4 percent (2 people) actually disagreed with the statement. Again, the results indicate information exchange solidly supports perceived legitimacy in the three watersheds studied here. The results are shown in the chart below.

In the focus groups, the importance of a public outreach campaign was mentioned numerous times as a key component of watershed collaboration success. Public outreach fits into the overall legitimacy element of information exchange and was surveyed in this study. The
question posed to the participants was, “The public outreach campaign in my watershed is effective.” For this question, the respondents were given a “not applicable” option along with the 7 Likert choices, just in case there was no public outreach campaign in the watershed. There were 8 respondents that chose the not applicable option, leaving a total of 42 out of the original group of 50 people who answered this question. Out of this group of 42, there was fairly good agreement that the public outreach campaign was effective, with 6 percent selecting strongly agree, 24 percent picking mostly agree, and 28 percent choosing slightly agree. However, there was a bit more disagreement than we have seen so far for the other elements of legitimacy, as 10 percent of the total (5 people) slightly disagreed and 6 percent (3 people) mostly disagreed with this statement. This is a bit of a surprise considering the positive results attributed to outreach by several people in the focus groups. Nobody chose the neither agree category. A chart for these survey results on public outreach campaigns can be is in Appendix F.

Included in the concept of information exchange is transparency. Literature research showed a strong call for an open and transparent process for watershed collaborations. How well does transparency hold up according to our survey respondents in the three watersheds? Very well, if you go by the results of a question that asked participants to rate their agreement to the following statement, “The partnership activities in my watershed are open and transparent to the point whereby all citizens are able to find out what is occurring in the watershed.” Out of a total of 50 people who answered this question, 84 percent (42 people) agreed with this statement, with 40 percent of those the selecting the mostly agree category. The strongly agreed category received the votes of 20 percent of all respondents, which is relatively high number for this category compared to other questions analyzed so far. Only 8 percent (4 people) chose the
neither category, 6 percent (3 people) chose slightly disagree, and 2 percent 1 (1 person) selected the mostly disagree category. A column chart for these results can be found in Appendix F.

11. **Local Knowledge**

Use of local knowledge is another of the 12 elements of legitimacy as identified in the literature search. The entire concept of watershed collaboration depends not only on use of scientific expertise, which is discussed below, but also tries to involve local knowledge since these collaborations are essentially place-based groups. Even though local knowledge and use of scientific experts are not mutually exclusive, these two can often conflict in certain situations. For this reason the question used here is worded in such a way as to force the respondent to pick local knowledge or science. The particular question used in this survey for local knowledge, and a few others, was taken from another study by Weible, Sabatier, and Lubell (2004). This question that tested local knowledge, and was used for calculating the local knowledge aspect of the overall legitimacy index, was phrased as follows, “Local preferences and knowledge should ultimately prevail, even when they conflict with the judgment of scientific experts.” There was actually more disagreement with this statement than agreement. Of the 50 people that answered this question, 52 percent disagreed with a preference of local knowledge. The most popular category was slightly disagree, which contained 28 percent of the total, followed by mostly disagreed with 22 percent. The opinions were somewhat split in that 34 percent of all respondents did agree with the statement, and 14 percent selected the neither category. This question is unique in that it poses this question in contrast to another element of legitimacy, scientific expertise, and so then the resulting split in opinions is not unexpected. The
respondents are essentially forced here to choose between local knowledge and scientific expertise. A preference for scientific knowledge over local knowledge is not unreasonable or unexpected, especially considering the high level of education of my respondents -- not to mention the fact that many of them work in professional, scientific occupations. The results for this question are shown in a chart that can be seen in Appendix F.

12. Scientific Knowledge and the Role of Science

The question used here for calculating the legitimacy index for the element of scientific knowledge read as follows, “Scientific methods present the best technique for understanding physical and socio-political issues in the watershed.” This question was also taken from the 2004 study by Weible, Sabatier, and Lubell, but unlike the question on local knowledge it did not force respondents to choose between it and local knowledge. It just uses the term “best technique,” so you would expect less of a split in opinion on this question, and that in fact turned out to be the case as 68 percent of the 50 people who answered the question picked one of the three agreement categories, with the largest percentage (36 percent of the total) selecting slightly agree. By contrast, 1 percent of the total (5 people), selected a disagree category. Clearly, the respondents for the most part liked the idea of relying on science in their watersheds. However, it should be noted that 22 percent of all respondents selected the neither category, perhaps revealing some consternation by respondents who debated the merits of both scientific knowledge and local knowledge. Another possible explanation is that some respondents looked upon local knowledge as a balance against overreliance on scientific knowledge, especially in
situations where scientific uncertainty is high, or simply as a means to temper science regarding local conditions or other contextual differences between watersheds.

Considering the heavy involvement of scientific personnel in watershed collaborations, the 11 undecided people signal a red flag regarding the use of scientific experts. The preference for scientific expertise was certainly higher than that for local knowledge based on these two questions, but there was less enthusiasm for scientific expertise than for most of the other elements of legitimacy as described earlier. These results are important to this study, because focus groups did not directly discuss the relative importance of scientific expertise versus local knowledge. However, a nested scale approach was mentioned in all three focus groups whereby local knowledge and citizen monitoring dominates at smaller scale, and capacity-building from UW extension, DNR, CMAP, and FREP are the main drivers at the larger scale. The results did not vary much by watershed as only 101 percent of the Rock River respondents disagreed with the premise that science is best, versus 17 percent in the SE Fox watershed, and 5 percent in the Poplar Creek watershed. The results for this question can be seen in the chart shown in Appendix F.

There were two other questions that I used from the Weible, Sabatier, and Lubell study (2004) that related to the concept of scientific knowledge. One question asked about a possible bias on the part of scientists and was essentially asking a negative. It was worded as follows, “Scientific experts often look for data, that supports their personal values.” A total of 50 people answered the question, and 48 percent of these actually agreed with this statement. This surprised me because many of the survey respondents are scientists or people who work for research organizations, and I expected a greater degree of faith in the scientific method. It should be pointed out however, that 36 percent of the respondents disagreed, pointing up a split
in opinions on the objectivity of scientists. Also, there were a large number of people (8) who picked the neither category, representing 16 percent of all respondents. The chart for this question is in Appendix F.

Many experts have advocated for local citizen input in the beginning phases of watershed collaboration efforts in order to have local input for framing the issues, and for determining priorities given the multitude of problems that can exists in a resource management setting. The final question I used from the Weible, Sabatier, and Lubell (2004) study attempted to measure respondents’ concern for that goal. The question read as follows, “I believe that watershed organizations should rely on stakeholder involvement in the beginning to determine which scientific issues to address.” This essentially asks about local involvement in scientific issues and represents a way of thinking that combines scientific expertise and local knowledge, at least in the beginning when issues are set up for watershed groups. There was high degree of agreement with this concept as 78 percent of the 50 respondents agreed with the question. Mostly agree got 42 percent of the total, the most for any category. There were 7 people who disagreed with this statement, representing 14 percent of the total. The neither agree nor disagree category got 8 percent of the (4 people) votes from the 52 respondents. The results for this question are summarized in the chart in Appendix F.

So, even though the role of science got strong support from our survey respondents, as one would expect, there was still some conflict shown regarding the use of local knowledge versus science. In addition, a higher number of people than I would have expected answered did indeed believe that scientists fall prey to personal bias and value judgments. Also, despite the strong support for science, the same group of respondents backed the involvement stakeholders in the initial, issue-defining stages of watershed collaboration.
From funding for sustaining watershed activities to incentives for best management practices, the proper role for government is a key point of debate regarding watershed collaborations. Should watershed collaborations be accountable to governmental entities as an earlier question alluded to? How much of the government’s role should be concerned with carrots (incentives) versus sticks (regulations)? What should government do about non-compliance of plans and recommendations in the watershed? These are just a few of the many questions that can be posed concerning the role of government in watershed partnerships. Some of these questions were addressed in the survey (accountability of watershed groups to governmental entities) for compilation of the legitimacy index. But there were additional questions not connected to elements of legitimacy that I wanted to test, as well. These were questions taken from other research efforts in other watersheds, particularly the Cache River of southern Illinois (Klauser 2004).

The first question dealt with how much of a stick the government should use for watershed partnerships. The question read as follows, “Regardless of the process, resulting plans should only be suggestions (advisory) for users of natural resources.” The responses for this question were roughly split with 41 percent of the 50 respondents agreeing with the statement and 53 percent disagreeing. The other 6 percent (3 people) selected the neither option. The strength of agreement seems similar to the strength of disagreement, with 22 percent of the mostly agree selections countered by 27 percent who picked mostly disagree. The 20 percent who picked slightly agree were balanced by 22 percent who chose the slightly disagree category. Another 4 percent of the total (2 people) selected strongly disagree. Because of this split one
must wonder about the typical voluntary-compliance mode that dominates most watershed collaborations, and whether such voluntary-based systems are effective or legitimate. It becomes appropriate to ask if we can expect improvements in water quality under a scenario where nobody is required to follow the resulting plans. This also calls into question the effectiveness of watershed collaborative efforts, and causes one to wonder if the time used in the formulation of these various plans and recommendations is well spent?

My survey also borrowed a corollary question from the Cache River study (Klauser 2004) that read as follows, “Regardless of the process, plans should be mandatory for users of natural resources.” As you can see, this question is the exact opposite of the earlier one, so we would expect to see the same but opposite results. Interestingly, we do not see opposite results. Reading from the charts for the two questions shown in Appendix F, we see that only 29 percent (14 people) selected an agree option and believe that plans should be mandatory, but 53 percent (26 people) on the previous question (same 49 respondents) believed that plans should NOT be advisory only. So, twelve people apparently believed that watershed plans should not be advisory only, but they were not sure or disagreed with the idea that the plans should be mandatory.

I investigated the results in Survey Monkey and identified seven people who disagreed that plans should be advisory only, but at the same time disagreed with the statement that plans should be mandatory. This seems contradictory to me because plans can be either advisory or mandatory: there are no other possibilities. I also identified five people who disagreed with the statement that plans should be advisory only, but then selected neither for the question that stated plans should be mandatory. This still seems contradictory to me. If you select one neither option you should select neither for the other, because these are mutually exclusive and opposite options.
These twelve respondents seem to want to have it both ways for two mutually exclusive scenarios.

I can only conclude from these contradictory results that this illustrates, in my opinion, the extreme reluctance on the part of many watershed participants to rely on government regulation of any sort. As described above, many of the people who believe we cannot rely on voluntary compliance only (26 people) are also hesitant to vote for more regulation (12 would not). Here we see the tricky and conflicted role of government that was mentioned in the focus group analysis. Some people are not comfortable with a reliance on voluntary compliance only, but cannot see forcing more compliance via mandatory measures. This contradictory attitude towards regulation was also uncovered in the focus groups, and appears to be widespread for the watersheds studied here. The two charts that summarize the findings for these two opposite questions can be seen in Appendix F.

So, there are significant differences in opinion as well as inner conflicts, regarding the exact role government should have in implementing plans for watershed groups. Is there general agreement that government has a responsibility to be involved in the protection of natural resources to some extent or another? One of the questions borrowed from the Cache River (Klauser 2004) study addressed this issue. The questions posed to the respondents read as follows, “Government has an obligation to establish policies so that natural resources are not degraded or wasted.” Unlike the previous two questions, there was no conflict or differences of opinion, as 96 percent of out of the 50 people who answered it agreed with the statement. In addition, agreement was strong with 55 percent choosing strongly agree and another 31 percent selecting mostly agree. The final 10 percent of the 96 percent selected the slightly agree option. Only 4 percent (2 people) selected neither agree nor disagree, and nobody disagreed with this
statement. But again, this is a more general question and gives us no idea of what people think government’s exact role should be in the accomplishment of this task. The chart summarizing these very positive results is shown in Appendix F.

Another more general question simply asked people if the well-being of citizens in the watershed is well-served by government policies for protecting natural resources. The questions states, “The establishment of natural resource policies will enhance the well-being of citizens in the watershed.” Again, there was almost total agreement with this statement on the part of the 49 respondents who answered the question. Only 8 percent (4 people) did not agree with the statement in one degree or another, and even these people selected the neither category rather than one of the disagree categories. Agreement was also strong just like the last question, with 49 percent picking strongly agree and another 37 percent going with the mostly agree category. Another 6 percent selected slightly agree. We see again the near universal idea that government must have some role to protect natural resources for the benefit of citizens, but the exact nature of that role remains unclear and remains a question mark for the legitimacy of these partnerships. The results for this question can be seen in the chart in Appendix F.

The last question from the Cache study (Klauser 2004) specifically targeted farmers who receive government assistance. Considering the large amount of land devoted to agricultural in my two Wisconsin watersheds, I felt like it would be appropriate to address the same issue here. The question was framed as follows, “Farmers should be required to implement management plans to protect soil and water resources in order to be eligible for government assistance.” Notice the issue has shifted from government’s responsibility to protect natural resources to the role of farmers. According to our 49 respondents who answered this question, there is widespread agreement that farmers who receive government aid are obligated to protect soil and
water resources. In results similar to the previous question, 92 percent of the 49 respondents agreed with this statement, and the 8 percent (four people) who did not agree selected the neither category. Again, agreement was strong with 59 percent selecting strongly agree and 33 percent choosing mostly agree. However, we must note that these results are lacking in specific details, since the question does not go into how farmers should implement programs for soil and water protection. The exact type of protection required could be subject to more debate amongst respondents, however. Those who agree with the general concept of protecting natural resources in return for government aid may feel differently about specific actions or policies required of farmers. This issue is one of the key areas that need to be addressed when determining the exact role of government and its connection to legitimate processes and outcomes.

Overall, the results from these questions show that the vast majority of respondents see a significant role for government in watershed organizations, but the nature of that role is very much up-in-the-air. While many people do want plans and recommendations to be advisory only, these same people seem very reluctant to enact strict government controls or regulations that would make them mandatory. I would summarize the prevailing theme that appears from this survey as one of conflict and contradiction regarding the role of government. The partnership respondents seem to advocating for a strong role for government but do not want increased regulation. If I add in the results from the focus groups, we get a clearer picture of watershed groups that clamor for more funding, technical support, and information exchange mechanisms from government -- but at the same time worry that government, particularly state and federal government -- might upset their collaborations by co-opting power, influence, and control from these place-based initiatives. Complicating matters is a question regarding tangible achievements on the ground, which illustrates the problematic nature of watershed collaborations.
CHAPTER 7
SUMMARY AND CONCLUSIONS

(A) Summary

The summary will focus on both successes and problems with watershed collaboration, as
evidenced by the focus group results and the survey. There were three focus groups for each of
the three watersheds, with each having unique problems and triumphs, but similarities emerged
among the three. I will start by elucidating the successes and problems for each of the three
watersheds and then attempt to determine commonalities among them. Next, I will lay out the
main ideas extracted from the survey, which included respondents from all three watershed
planning groups. Any group differences will be discussed as well as common themes occurring
for all participants, regardless of their watershed. A conclusion will follow the summary.

Rock River Focus Group

Like the other two watershed groups studied in this research paper, the Rock River has a
history of success and stability. Among these successes were the presence of strong and effective
leadership (basin facilitator) and a well-defined sense of a planning-process and plan. Capacity-
building and expertise were provided by the Rock River Basin Coalition to smaller watersheds,
while local knowledge and monitoring filtered up, illustrating a successful example of nested
scale operations. Fairness was rated by most as very good, and education and outreach
campaigns were critical additions to the capacity-building efforts of the larger Rock River
Coalition.
Despite the success of this longstanding group, however, certain issues and problems presented themselves in the focus group. One of these problematic issues was trust. While efforts to build greater trust seemed to be having a positive effect in the Rock River Basin, a history of distrust on the part of many citizens toward the Wisconsin DNR still persisted. This distrust complicated watershed collaborative efforts and illustrates how difficult it is to overcome negative perceptions toward government agencies and related institutions. This is a prime example of the importance of context as described by Sabatier et al. (2005) in their work on watershed collaboration. In this case, the context of a lack of trust worked against the success and positive efforts of those involved in the Rock River Basin. Because the Rock River Partnership works with the DNR, comments to partnership personnel from residents like, “I don’t want to talk with you, you get money from the DNR,” were not unusual (comments relayed to me by DNR personnel in the focus groups). Improvements in the level of trust have come very slowly over time, and thus still present a barrier to legitimacy in this watershed.

Regulation was a conflicted issue in that some people communicated a need for greater governmental involvement in this area, while others seemed determined to maintain the current low levels of regulation. In addition, some people simultaneously called for more accountability while at the same time decrying any increased use of governmental oversight. Very few participants seemed to want increased governmental regulation, and there was a sense of resentment about an increase in this type of activity. However, there was also a different type of resentment on the part of some citizens who felt the DNR and other institutions were not doing enough to protect water resources. Regulation of land use, which was a major component of plans to increase water quality, was described by many focus group participants as fragmented and inconsistent. One of these focus group members referred to a lack of regulatory power as
“death by a thousand cuts,” while another claimed that it was “not within our purview to take on some of the really contentious issues.” Based on the focus group discussion, it was often not clear who had the authority to deal with these types of contentious issues, despite discussions that focused on this topic. The historical lack of trust towards the DNR also complicated any efforts to add regulations to the mix. A chart used earlier in the paper highlights the main topics of legitimacy discussed in the three watershed focus groups, and is placed below for ease of reference. The problems uncovered during the Rock River focus group discussions and in the other two watersheds are summarized in this table (Table 7.1).

Table 7.1 - Summary Table of Common Themes: P = Positive Factor, N = Negative Factor
B = Both positive and negative, and Blank Space = No factor discussed in group.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Rock River</th>
<th>SE Fox</th>
<th>Poplar Creek</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Diversity</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Scale and Participation</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Context of Distrust</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Success in Enhancing Trust Over Time</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Consensus – Time Needed</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus - Avoiding Issues</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus – Not Unanimity</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus – Better Results</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairness – Just Outcomes</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Leadership</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Scale -The Nested Approach</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Role of Government</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Proximity to Water</td>
<td></td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Voluntary Compliance</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Fragmentation Jurisdiction</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>
Another issue of importance in Rock River is participatory diversity. Although the Rock River Coalition (RCC) provided ample opportunity for any interested citizens to get involved in watershed group participation, such participation was in the end stilted towards certain demographic groups and individuals. This stilted participation occurred even though focus group members told me several times that membership was open to any citizen, and that current members actively recruited people from different areas of the watershed. This occurred not because of any bias or restrictions on the part of the Rock River Coalition (RRC), which went out of its way to illicit broad participation, but rather because of what I call the “voluntary effect” regarding watershed collaboration. People who are already involved or otherwise interested in water quality issues are most likely to partake in what are essentially time-consuming processes. Often these participants are educated professionals who work for various governmental agencies that target land use and water-related issues. The watershed collaboration was disproportionately white, middle to upper income, and highly educated. Unlike the other two watersheds, females had greater representation than males in Rock River Basin Coalition. Despite efforts from groups like the RCC, recruiting volunteers from lower socio-economic groups and non-
professional occupations turned out to be very difficult. Several focus group members speculated that lower income groups do not have the time and resources required for participation in an intensive deliberative process that can involve a fair amount of travel. It should be noted, however, that nothing was found in the literature regarding distance of travel as an impediment to participation.

Because of the travel requirements in a big basin such as the Rock River, moving the meetings locations to different places in the watershed can foster more diverse participation. This was mentioned in the focus group as a strategy that the RRC had employed in the past. Still, the demographics of watershed organizations continue to be heavily weighted towards mostly white, highly educated professionals with a prior professional interest in water-related issues. The voluntary nature of such groups is what I believe continues to trump any efforts to attain a more diverse type of representation in watershed collaborations, and greatly threatens participatory legitimacy in these groups.

**SE Fox Focus Group**

Like the Rock River group, the partnership in the SE Fox River of southeast Wisconsin (SE Fox River Partnership) had much long-term success with regards to capacity-building, education, outreach, and coordination at different scales. Also, like the Rock River, leadership was secure, stable, and effective. The nested scale was also effectively used in this watershed, as monitoring and local knowledge from below met scientific expertise and resources from above (basin level). As a basin organization in southern Wisconsin this group also suffered from the same lack of trust as that experienced to the west in the Rock River. The DNR was again the
main culprit, and many people associated the DNR with watershed collaborations and thus transferred their lack of trust from the former to the latter. But like the Rock, the effective and continued outreach and education campaign in the basin served to alleviate some of that lack of trust. But here it has also been a long-term process and has progressed slowly.

The voluntary-participation effect that I described above for the Rock was also a problem for participatory diversity here, with trust acting as another driver of participation. In the SE Fox focus groups, however, discussion centered on how greater distrust translated to greater participation. Often watershed group meetings were jammed with people when the issue revolved around restrictions of activities along the shoreline. The more contentious the issue and the more distrust exhibited toward the DNR, the greater the number of people who attended these meetings. Public participation was directly a function of how close someone lived to the waterway, as well as how much that person distrusted those in charge. The former is basically a reaction to threats against perceived property rights, and the latter mirrored studies cited by Sabatier et al. (2004), who described a lack of trust as a major motivating factor for participation.

Also, similar to the Rock were the problems associated with government regulation and the dichotomy surrounding views toward more regulation. Land use control was discussed in the group, and it was described as fragmented, inconsistent, and often ineffective. Some people in the watershed would complain about lack of effective regulation while others decried the interference of various agencies. The idea of embracing more regulation was no more popular in this watershed focus group than in the Rock River, however. Calls for a stronger role for government were more than offset by those willing to continue betting on voluntary compliance.

But like the Rock, the issue came back to funding and the role of government. This focus group was just as convinced that more funding was the key to success, and the worry remains
that the same political forces that argue for voluntary compliance over governmental regulation are the same ones that will insist that these groups do more with less money. If that is the case, failure will occur here as well.

**Poplar Creek Focus Group**

Capacity building and scientific expertise were essential to successes in the much smaller Poplar Creek watershed, just as they were for the bigger Rock River and SE Fox basins. Poplar Creek received much of its support from umbrella groups. Much of the strong leadership that benefitted Poplar Creek came from these umbrella groups as well. The Chicago Metropolitan Area Planning Commission (CMAP) was the main umbrella group operating in the Poplar Creek watershed, and the Fox River Ecosystem Partnership (FREP) was a secondary basin-level group that also provided support to the group known as the Poplar Creek Watershed Coalition (PCWC). The nested-scale approach was used here very effectively, as well, and in this case it was umbrella groups who provided the top-down scientific, economic, and managerial support for the PCWC. It was noted in this focus group that the issue itself often dictated the best scale for dealing with it. Open and effective information exchange was also credited with fostering cooperation between large and small scale institutions, which greatly aided the nested-scale approach.

This group was different from the others, however, not only because of its size but also because of its evolution over time. Initially a grass-roots citizen group that was often at odds with governmental agencies, the PCWC leadership decided at some time to accept cooperation from the larger organizations and became more of a hybrid group as described by Moore and
Koontz (2002). This watershed organization also relied on more local government support in the form of village and town officials from municipalities, than did the two bigger basin groups. The strong backing by these villages was described as one of the main reasons for its sustainability. In addition, the high quality of representation from the villages and the umbrella groups was mentioned as a major positive factor related to the Poplar Creek Watershed Coalition. Several focus group members described a lack of an agenda on the part of most officials, illustrating the quality of representation. This quality of representation led to a high level of trust, another good quality associated with the Poplar Creek Watershed Coalition. It was mentioned that agency and village personnel “meshed well” together, which strengthened the trust between the various representatives.

It should be noted, however, that the trust between citizens and governmental agencies regarding watershed issues was not as strong as the trust between the various agency personnel and officials. In this way, the situation mirrored the distrust in the SE Fox and the Rock River, but not to the same negative degree. Also, trust was hindered by a common theme in environmental literature, scientific uncertainty. Despite its small size there are very few monitoring stations within the Poplar Creek Watershed, and for this reason it was often difficult or impossible to determine the source of various pollutants. The other two focus groups did not mention a paucity of water quality gauging stations, but I suspect they suffered from the same problem. In the Poplar Creel watershed, a lack of data led to a sort of blame-game whereby certain municipalities blamed other towns for various problems in the waterway. One focus group member expressed surprise at the blame his municipality received from another village representative for sedimentation problems considering the numerous measures they undertook to control this pollutant. Accurate and timely scientific data can take the sting out of such
criticisms via delineation of sources, while at the same time reducing the conflict and lack of
trust associated with uncertainty. But such increases in monitoring capabilities require more
funding than presently available, again highlighting the importance of increased resources for
collaborative activity.

One problem mentioned with regard to umbrella organizations was the potential for
facilitators and resources to get shifted onto other projects over time. After all, such umbrella
groups are not working solely on the problems of only one or two watersheds. Along with this
concern over shifting priorities came the expressed doubts about following up on planned
outcomes, and the loss of accountability accompanying such negligence. There was some debate
in the Poplar Creek focus group whether actions and future outcomes written up in the plans are
really followed though in the long term. One person referred to this as a critical “loss of
momentum.” Only time would tell if the ball gets dropped on some key issues, but lack of desire
to follow through or implement recommended plans certainly does present an accountability
issue regarding outcomes. Umbrella groups like CMAP were often in charge of implementation,
but their personnel were often diverted to other projects which hindered follow-through actions.

Discussion of Focus Group Results

Funding was a key issue discussed in all three of the focus groups as a major ingredient
for continued capacity-building, education, and outreach successes. Although the two were not
linked directly in the focus group discussion, I firmly believe that regulation and funding are
strongly associated with one another. If collaborative groups and the general public want to
avoid greater regulation to solve watershed problems, it may become necessary to spend more
money, not less. Accelerated efforts via collaborations may in the long run be more expensive than simply increasing regulation and enforcement from governmental agencies. In addition, regulation seems more certain to attain compliance with various plans and recommendations designed to improve water quality in the basin, whereas the collaboration approach may involve the expenditure of large amounts of money with little or no guarantee of implementation. It may not be possible to have it both ways -- lower costs and less regulation, as I suspect many politicians and citizens would like to see.

But would more regulation be feasible from a political and legal perspective? Recent trends have seen a reduction in the regulatory approach, supported by many citizens who believe environmental regulation hurts job growth. In his book, *The trade-off myth: fact and fiction about jobs and the environment*, Eban Goodstein cites numerous studies to debunk this widely held notion. Indeed, a quick look at the latest Bureau of Labor Statistics for the first quarter of 2013 (the latest quarter listed), shows that 1266 layoffs out of a total 133,284 were attributed to “governmental regulation/intervention,” (which include all regulations, by the way, and not only environmental regulation), and this amounts to less than 1% all layoffs reported for non-farm labor in that quarter (Bureau of Labor Statistics, 2013). In fact, jobs are created from regulation because the manufacture of high-tech products used to ameliorate pollution, as well as the retrofitting of buildings for energy efficiency, spurs the growth of blue-collar jobs that often pay a high wage (Goodstein 1999). Still, firmly entrenched beliefs often rooted in strict ideology do indeed die hard, and many people still hold onto the concept that economic interests and environmental protection need to be “balanced” in some type of trade-off. In addition to negative perceptions about regulation’s effect on jobs, there exists the notion that regulations’ costs exceed its benefits. Again, this notion persists despite numerous studies to the contrary.
(Shapiro and Glicksman 2004). Still, politicians get a lot of mileage by presenting themselves as “Davids” battling the “Goliath” of government regulation, and by feeding the fears of workers who have a deep seated insecurity about their economic and employment future. This fear of regulation’s impact on economic well-being is even more pronounced during slow-growing economic times such the period we are in right now.

Another impediment to regulation as a way to deal with water quality impacts lay on the legal realm. Here the prospects for future environmental regulations are mixed and the situation is even less clear than the political picture. A 1992 Supreme Court decision, “Lucas versus South Carolina Coastal Council,” initially seemed to act to thwart the nuisance exception that allowed governments to avoid judgments against them based on the takings clause of the Fifth Amendment. This nuisance exception goes way back to an 1887 case called Mugler versus Kansas. In Keystone Bituminous Coal Association versus DeBenedictis, a much more recent case from 1987, the Supreme Court even expanded the definition of nuisance by declaring that government actions to prevent harm do not qualify as a taking, even if private property is destroyed. The Lucas case changed all this five years later when a majority of Supreme Court justices agreed with an owner of two coastal property lots (David Lucas) who wanted to develop this property but was prevented by the South Carolina Coastal Commission. They ruled that the coastal regulations here amounted to an elimination of all value from Mr. Lucas’s lots, and thus he must be compensated via the takings clause, to the tune of 1.2 million dollars. This case gave great hope to anti-regulatory and pro-development forces throughout the country, but according to a recent article (Blumm and Ritchie 2005) its effect over the years has NOT been to foreclose the use of nuisance law to defeat takings lawsuits. In fact, the Supreme Court opened the door to “background principles inquiry,” and that a taking would NOT occur in situations where the state
is merely doing the same thing that neighboring landowners could do if they brought a private nuisance suit to the courts. So while initially seen as a threat to regulatory efforts in favor of ecosystem protection, the Lucas decision opened up a series of commonly-used defenses to defeat or stop takings lawsuits based on governmental regulation (Blumm and Ritchie 2005).

However, as mentioned above, increased regulation was not a popular idea within the collaborative groups, and is still very much seen with disdain by many in the public. This was heard in focus group discussions and seen in the results of the survey. But there is still some concern about the effectiveness of voluntary compliance alone in achieving the desired outcomes in the watershed. Why is there such a reluctance to increase regulations among many of the focus group participants? Is this attitude due to the greater effectiveness of voluntary-based compliance as practiced in consensus-based collaborations? There is no evidence to support this idea, and in the Chesapeake Bay water quality has gotten worse despite many years of collaborative efforts. Many other watershed organizations have not been around long enough to prove their effectiveness. Still, other watersheds lack the baseline data or monitoring network to document improvements to water quality and other physical parameters. Thus, uncertainty about the successes for improving the physical conditions of the watershed besets many watershed organizations (Kenney 1999).

Another possible reason to reject more regulation could simply be a reflection of the unpopularity and resistance to any further governmental action. In other words, it is a politically-based decision. If that is the case, I unfortunately see a future where reduced regulation and lower costs are the primary, if unstated, goals of watershed collaboration, rather than improvement of the physical, economic, and sociological conditions in the watershed. It may be possible to improve conditions in the watershed without major regulatory additions, but not
without a steady and ample supply of funding from governmental sources. The worry here is that the same political forces that push for less government regulation also will push for less funding for the alternative collaborative approach. If that occurs, water quality will surely suffer and the entire effort will fail miserably. Any rejection of increased governmental control may be politically popular, but doing so on the cheap is a perilous path to failure.

After listening to hours of discussion on this matter my view is very clear. If you do not install a more effective governmental regulatory system it will become necessary to appropriate much larger amounts of money for collaboration efforts. Otherwise, these efforts are doomed for failure. Additional funding for the process of watershed planning is of paramount importance, and there can be no compromise on this issue. Only time will tell if such funding will materialize and be maintained over the long haul. Of course, increased funding does not guarantee success. It could very well depend on how the money is allocated and what projects receive priority. Will effective BMP’s be established as a result of such funding, or will the money be used as window dressing to give an appearance of accomplishing something? Even if larger amounts of money are appropriated for watershed collaborative efforts, there is no guarantee that landowners and others will follow BMP’s or other recommendations. These are all present possible roadblocks to successful watershed collaboration.

Education and outreach were key methods utilized by all three watershed collaborations, as well as by the larger umbrella organizations. One focus group member in the PCWC stated that members were “comfortable with this type of activity.” In the same discussion, several members of PCWC expressed distaste for greater governmental regulation, even more so than what I found for the two larger basin groups. One person referred to it as “snitching on” her neighbors. Another member of the group, however, challenged this idea and felt that the heavy
reliance on collaborative methods such as education, outreach, and voluntary compliance were due to lack of enforcement of existing regulation. The only option left, therefore, was the one relying on voluntary compliance assisted by education. In short, he expressed the same concern I put forth earlier about voluntary compliance being favored more for its convenience or political reasons, rather than for its effectiveness.

So again I come back to the issues of regulation, the role of government, and funding. It seems imperative to me that funding must be increased if we continue to rely on education and voluntary compliance to achieve the results we desire in our watersheds. In order to ensure the long-term sustainability of collaborative groups, funding must be more than adequate, and it must be used to develop plans that lead to on-the-ground improvements and not just for more meetings and collaborative discussions that do nothing but provide a false sense of accomplishment. A call for increased monitoring stations and data collection in order to avoid scientific uncertainty and an associated lack of trust is just one of the many reasons to argue for a guarantee of ample resources. Denial of funding could threaten follow-up actions and endanger long-term success. However, even greater levels of funding may still be insufficient absent more targeted government regulation, a topic I will discuss more in the conclusions.

**Overview of the Legitimacy Index**

One of the main goals of this research was to develop a metric for measuring legitimacy. The legitimacy index developed here seemed to be a reasonably effective tool for measuring perceived legitimacy. There did not seem to be large differences in the legitimacy index values calculated using the two different weighting systems -- survey and literature review. Of the 22
statistical tests run on perceived legitimacy (LI), only two sets of tests four came up with different results (significant versus insignificant) for the two weighting systems. One set of tests that showed different results for the different weighting systems involved the impact of consensus on LI, but even these two were not vastly different when the probability values are examined (0.061 for survey weights versus 0.192 for literature review weights). The other pair of tests showing disparity between the weightings systems was the influence of stakeholder type on LI, and here the difference in significance values was much larger (-0.088 Spearman Rank correlation value for survey weights and -.496 correlation for literature review weights). It seems to me, therefore, that the results of statistical tests were similar for both weighting systems, and that both systems were more similar than different.

A Mann-Whitney test was also used to compare the LI rankings of the two weighting systems and no significant difference was found (see table 7.3 below). The LI values for the three watersheds were also compared. Even though the LI values for both survey weights and literature review weights were higher for SE Fox than the other two watersheds (see table 7.2 below), no significant differences were detected for the three watersheds for both LI survey and LI literature review when two Kruskal-Wallis tests were run (see table 7.3 below).

Therefore, even though LI with survey weights seemed more sensitive to differences among watersheds and groups based on various characteristics, I conclude that both LI value weighting systems are similar and effective for use in the statistical tests run here. This conclusion is based on the results of numerous statistical tests conducted in this research paper. I also conclude that these LI values can be useful for comparing the perceived legitimacy of watershed participants and citizens for future studies. These LI values were useful in attaining at least a rough measure of perceived legitimacy in the three watersheds studied here, and should be
effective in the future for detecting changes in perceived legitimacy over time. Two earlier charts showing the LI values for the different watersheds (Table 7.2) and the results of statistical tests (Table 7.3) are below for ease of reference.

### Table 7.2 - Average LI Values for Each of the Three Watersheds

<table>
<thead>
<tr>
<th>Watershed</th>
<th>LI-Survey-Response</th>
<th>LI-Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock</td>
<td>56.93</td>
<td>56.83</td>
</tr>
<tr>
<td>SE Fox</td>
<td>61.04</td>
<td>62.23</td>
</tr>
<tr>
<td>Popular Creek</td>
<td>56.36</td>
<td>58.68</td>
</tr>
</tbody>
</table>

### Table 7.3 - Tests for Legitimacy Index Values (LI)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Statistical Test</th>
<th>Test Statistic Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LI - Survey Weights versus LI - Literature Review Weights</td>
<td>Comparison to see if a Difference Exists</td>
<td>Mann Whitney U</td>
<td>U = 1083.5</td>
<td>NS</td>
</tr>
<tr>
<td>LI Survey Weights versus Literature Review Weights</td>
<td>Comparison to see if a Correlation Exists</td>
<td>Spearman Rank</td>
<td>Spearman Rho = .906</td>
<td>*</td>
</tr>
<tr>
<td>Watershed (Rock, SE Fox, and Poplar Creek)</td>
<td>Legitimacy - LI Values - Survey Weights</td>
<td>Kruskal-Wallis</td>
<td>H = 2.284</td>
<td>NS</td>
</tr>
<tr>
<td>Watershed (Rock, SE Fox, and Poplar Creek)</td>
<td>Legitimacy - LI Values – Literature Review Weights</td>
<td>Kruskal-Wallis</td>
<td>H = 3.73</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Significant at the 0.10 Level
** Significant at the 0.05 Level
NS = Not Significant

### Impacts of Scale, Consensus, and Demographics on Perceived Legitimacy (LI)

Another goal of this paper was to investigate the role of scale, consensus, and demographic diversity on perceived legitimacy. Survey results dealing with these three issues were tested statistically earlier in the paper to determine their possible impacts on legitimacy. A
quick summary of those results will be discussed here, and a table showing these results can be seen below in Table 7.4. Scale was analyzed first, and statistical tests comparing scale against legitimacy (LI) showed no relationship. A lack of significant results applied for both weighting systems. The results were similarly insignificant for two different methods of categorizing scale: a three level system broken down into small, medium, and large levels, as well as for a 2 level comparison of small and large scales.

Consensus was analyzed next and the results were quite different. The relationship between consensus and perceived legitimacy (LI values) was stronger than that for scale, and some statistical tests were significant at the 0.10 level. I was using the 0.10 level as a cutoff due to the exploratory nature of my research. As mentioned above, survey-weighted LI was more sensitive to differences, with both a 4-level consensus test and a 2-level test being significant at the 0.10 level. However, four and two level tests of consensus against LI using literature review weights were insignificant, but barely so at the 0.10 level (actual p-values were 0.19 and 0.14 respectively). Thus, it appears that consensus has the potential at least, to be a significant factor negatively affecting the perceived legitimacy of watershed planning. Due to the importance placed on consensus in watershed collaborations, this negative effect is very troublesome from a legitimacy perspective. Future research should look at this relationship between consensus and perceived legitimacy in different watersheds and with a larger sample size.

Demographic diversity for participants was measured via numerous questions on the survey, and this was the third and final main issue compared to legitimacy. Among the factors tested against legitimacy (LI values) were income, education level, residence type, stakeholder type, and group participant status (watershed group participant or not). The only two demographic factors that had any significant relationship with legitimacy were stakeholder type
and group participant status. All of the tests comparing income, education level, and residence type were insignificant.

Stakeholder type was tested with an aggregation of stakeholders via two different ways. One method aggregated stakeholders into four different groups: (1) government and educational, (2) grassroots and environmental groups, (3) public citizens, and (4) farmers, real estate developers, and other business interests. The other method divided stakeholders into two main groups: (1) governmental and educational institutions, and (2) all others. The four level tests for legitimacy were insignificant at the 0.10 for LI using both weighting systems. The two level test comparing stakeholder type to LI using literature review weights was also insignificant at the 0.10 level, but a similar test with LI based on survey weights was significant at the 0.10 level. Thus it seemed that stakeholder type may have some impact on legitimacy, at least when comparing government and educational officials to other private citizens and groups. For the watersheds studied in this paper, government officials had a higher perception of the legitimacy of the group efforts than other stakeholders. This could be a threat to watershed collaborations that try to involve all stakeholders in the process, because some stakeholders may not officially buy into the plans, recommendations, and outcomes of the group as much as government officials do. This poses a serious impediment to the efforts to maintain and improve water quality in the watershed. Most of the educational and governmental agencies have water resources protection as a major goal of their agencies, and their group representatives are getting paid to increase water quality. Thus, these results may not be a surprise especially when one considers that farmers and real estate interests involved in such watershed collaborations have an economic agenda unrelated to water quality. For this reason, they may see the group’s efforts as less legitimate than government officials.
The other demographic factor that showed a relationship to legitimacy was group participant status: presently active group member versus non-active. The non-active group included some who had worked for watershed partnerships in the past. Both two-level tests of group participation status against LI were significant at the 0.05 level: LI based on survey weights and LI based on literature review weights. Unlike other tests, this one showed that LI values based on literature review weights had a more statistically significant relationship to the variable in question (stakeholder status in this case) than the survey weighted LI values. The results here are hardly surprising. It would normally be expected that those heavily involved in watershed groups might rate their efforts more highly than others who not directly participating in the process. These results point out the need to conduct future surveys based on a larger list of non-participants.

Based on the analysis of demographic factors for watershed group participants, stakeholder type and group participant status seem sensitive to impacts on perceived legitimacy as measured by the LI values, and should be a focus of future research. If only certain stakeholder types (in this case government officials) and active participants in the watershed see the collaborative process as legitimate, and other important stakeholder groups and resource owners who are not involved are much less enthusiastic, then the entire process may be at risk of failure. These other groups may not put much importance on the implementation of projects or plans to improve water quality, and so the very purpose of watershed groups is defeated. The demographic diversity of citizens in the watershed is another matter, and I will save my comments on that for the conclusions. A summary chart showing the impact of the three issues of scale, consensus, and diversity on perceived legitimacy (LI values) is listed below (Table 7.4). There are tables in chapter 6 that show the detailed results of statistical tests for scale, consensus,
and diversity individually, but Table 7.4 is a brief summary of all three of these variables regarding their relationship to LI.

### Table 7.4 - Tests for Impacts of Scale, Consensus, and Diversity on Legitimacy Index Values

<table>
<thead>
<tr>
<th>Main Factor Tested</th>
<th>Significant Impact on Legitimacy</th>
<th>Level of Categories Tested</th>
<th>Tests Used</th>
<th>Type of LI Impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>No</td>
<td>Scale 2 and 3 Levels - Both Insignificant</td>
<td>Mann-Whitney, Kruskal-Wallis, and Spearman Rank</td>
<td>Neither</td>
</tr>
<tr>
<td>Consensus</td>
<td>Yes</td>
<td>Consensus - 2 and 4 Levels – Both Significant</td>
<td>Mann-Whitney, Kruskal-Wallis, Spearman Rank, and Chi Square</td>
<td>Both LI-Survey and LI-Literature Review</td>
</tr>
<tr>
<td>Diversity Factors</td>
<td>2 Factors</td>
<td>Income – 7 Levels Education – 5 Levels Residence Type – 4 Levels Stakeholder – 2 Levels Stakeholder – 4 Levels Group Status – Participant or Not</td>
<td>Mann-Whitney and Kruskal-Wallis</td>
<td>Neither</td>
</tr>
</tbody>
</table>

The Impact of Scale and Consensus on Selected Issues

The impact of scale and consensus on other issues besides overall legitimacy were also statistically tested. These issues were derived from the literature review. Some writers hypothesized that scale and consensus could have effects on local knowledge, concern for impacts outside of the watershed, local environmental issues, and national environmental concerns. The relationship between various demographic factors and other elements related to legitimacy were not tested statistically due to a lack of citations in the literature. However, these demographic factors were tested against overall legitimacy as described above. In addition,
threats related to the homogenous demographic make-up of watershed groups is described in the following section.

First, it was hypothesized that smaller-scale watershed groups would rate local knowledge higher as an element of legitimacy than larger scale groups. One Chi-Square test comparing two levels of scale versus 2 levels of local knowledge came very close to the 0.10 probability cutoff of 0.10 (p = 0.117) for statistical significance. In addition, another test that used a Spearman Rank correlation of three levels of scale (small, medium, and large) versus ranked data of local knowledge came up with a significant result (p = 0.066). Thus, it seemed that smaller scale watershed respondents do indeed put more of an emphasis on local knowledge than respondents from larger-scale planning groups. On the other hand, even though smaller-scale watershed participants were thought to have less concern for issues outside of the watershed, statistical tests described earlier show that this was not the case. No significant relationship was discovered between scale and concern for issues outside of the watershed. On a positive note, concern for these issues was similarly strong across all scales.

Consensus was the next concept to be tested with regard to several other legitimacy factors. One factor was the concern for impacts occurring outside of the watershed, with the expectation that consensus-based groups would have less interest in these issues. This is based on the literature review that described the tendency for consensus-based groups to worry more about attaining consensus that dealing with difficult issues. Any impacts outside of the watershed would certainly qualify as one of these difficult issues. Like scale, this test was insignificant, and no relationship was determined between consensus and concern for impacts outside of the watershed.
Another test focused on the thesis that striving to reach consensus would trump a desire to deal with all the issues in the watershed, no matter how difficult or contentious. A survey question asked respondents about their group’s desire to deal with all the issues no matter how difficult, and these results were tested against the two levels on consensus (yes or no). Again, the results were negative, and no relationship was detected from the Chi-Square test comparing the categories of the two variables.

Consensus as a decision-making strategy was also expected to have a negative impact on the desire to deal with both national and environmental issues as related to the watershed. Again, the theory from the literature led to an expectation that consensus would work against the environmental goals at these two scales. Statistical tests showed this not to be the case, and no relationship was found between consensus and the desire within the watershed to tackle either national or local environmental issues.

Whereas consensus had no significant impact on local knowledge, concerns for impacts outside of the watershed, or environmental interests -- results showed a negative relationship between consensus and inclusiveness that many authors warned about. A four-level Mann-Whitney U test of consensus against inclusiveness rankings was significant at the 0.10 level. A Chi-Square test comparing two levels of consensus against two categories of inclusiveness was insignificant at the 0.10 level, but had a probability of 0.141. Thus, consensus is shown to be a threat to inclusiveness in these three watersheds. Future research on the negative role consensus plays in inclusiveness is warranted by these test results, as well as by the results of several questions on my survey that addressed both exclusion and self-exclusion of stakeholders. These will be summarized in the next section on threats to legitimacy based on survey questions results.
Impact of Scale, Consensus, and Participatory Diversity on All Variables

The summary table of significant results below (Table 7.5) illustrates which of the following major factors studied here -- scale, consensus, and participatory diversity (demographics) -- had a significant impact on perceived legitimacy (LI) or other elements. In this study, scale had no significant impact on perceived legitimacy as measured by the two differently weighted LI values, but it did affect the importance placed on local knowledge with smaller scale groups more likely to rely on this type of information. This again was an expected result based on the literature.

Consensus as a decision making strategy affected perceived legitimacy in a negative way, particularly when LI values based on survey weights were used. More importantly, consensus had a negative significant impact on inclusiveness, particularly self-exclusion by stakeholders impatient with the time-consuming nature of the consensus-building process.

These results confirm others studies and conclusions from the literature review, and bring up red flags regarding consensus and legitimacy. Of course, future research is needed to test this further and see if the results can be generalized to other watershed groups. In the meantime, projects and outcomes coming out of consensus-based groups should be scrutinized for issues of inclusiveness, legitimacy, and avoidance of contentious issues.
Table 7.5 - Summary Results for Effects of Scale, Consensus, and Demographic Diversity: Statistical Tests that Showed a Significant Relationship are shown

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>Local Knowledge</td>
<td>Small Scale Increased the Focus on Local Knowledge</td>
</tr>
<tr>
<td>Consensus</td>
<td>Perceived Legitimacy (LI Value using Survey Weights)</td>
<td>Consensus strategy decreased LI values</td>
</tr>
<tr>
<td>Consensus</td>
<td>Inclusiveness</td>
<td>Consensus strategy decreased Inclusiveness</td>
</tr>
<tr>
<td>Stakeholder Group Type</td>
<td>Perceived Legitimacy (LI Value using Survey Weights)</td>
<td>Government Stakeholders showed higher LI values than Private Groups</td>
</tr>
<tr>
<td>Group Participant Status (Active in Group Presently or Not)</td>
<td>Perceived Legitimacy (LI Value using Both Survey Weights and Literature Review Weights)</td>
<td>Active Participants showed Higher LI Values than Non-Participants</td>
</tr>
</tbody>
</table>

Two demographic factors affected perceived legitimacy according to these tests: stakeholder type and group participant status. Government stakeholders exhibited higher perceived legitimacy (LI values) than non-government stakeholders, an expected result based on the literature, as well as common sense. Participant status also affected perceived legitimacy, with active participants having higher LI values than non-active or past participants. These results were also to be expected. These were the only two demographic factors tested that showed a significant result. Above, Table 7.5 shows a summary of the results of tests on scale, consensus, and demographic factors. Table 7.6 lists all of the statistical tests run in this paper.

Table 7.6 – Results of All Statistical Tests for Scale, Consensus, and Demographics

<table>
<thead>
<tr>
<th>Test</th>
<th>Indep. Variable</th>
<th>Depend. Variable</th>
<th>0.10</th>
<th>0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kruskal-Wallis</td>
<td>Scale (3 levels)</td>
<td>LI survey weights</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Mann-Whitney U</td>
<td>Scale (2 levels)</td>
<td>LI survey weights</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Kruskal-Wallis</td>
<td>Scale (3 levels)</td>
<td>LI literature weights</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Mann-Whitney U</td>
<td>Scale (2 levels)</td>
<td>LI literature weights</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>Scale (3 levels)</td>
<td>Local Knowledge</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Spearman Rank</td>
<td>Scale (3 levels)</td>
<td>Local Knowledge</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Spearman Rank</td>
<td>Scale (3 levels)</td>
<td>Issues Outside WS</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Elements of Legitimacy: Overview of the Major Threats as Determined by the Survey

Earlier I discussed in detail how various elements of legitimacy fared regarding the focus group results. Here I have summarized the threats to legitimacy from the various elements as determined by the survey, and categorized these elements into different threat “levels” that can be seen in Table 7.7 below. Basically, the higher the disagreement with the legitimacy of that element, the higher the “threat” level to overall legitimacy. A “Low” threat level would occur if 16% or less disagreed with that element’s legitimacy. For elements receiving 16 to 25 percent
disagreement, a significant minority, the threat level was categorized as “Medium.” If 26 to 50 percent of the respondents disagreed about an element’s legitimacy, it received a threat level of “High” due to the sizable minority of people selecting disagree (or agree if the question was worded negatively). If more than 50 percent of the respondents did not see the legitimacy of an element, it received a “Very High” threat level, considering that the negative selectors actually represented a majority. Admittedly, these cut-offs were chosen arbitrarily and were based on my own judgment. However, it seems very problematic if 50% or more of a group of respondents disagree or have doubts about the legitimacy of a given element. Even a significant minority of respondents who have doubts – such as 25% - would indicate potential legitimacy problems.

As can be seen from Table 7.7 below, which lists the highest threats at the top and the lowest at the bottom, the elements that had the lowest threat levels were “Representation (Overall),” “Transparency,” “Public Participation,” and “Information Exchange.” The next level of threat was Medium and there were 4 elements that fell into that category: “Inclusiveness,” “Trust (Overall),” “Just Outcomes,” and “Scientific Expertise.” The High category contained four elements: “Stakeholder Diversity,” “Representation (Based on Influence Ratings),” “Fairness (Based on Influence of Stakeholders),” and “Trust (Over Time).” Finally, the Very High threat category also had four elements: “Inclusiveness of Elected Officials,” “Fairness (Overall),” “Accountability,” and “Use of Local Knowledge.” It can be seen that some of the elements were split because several questions were asked about a given element, and thus there were varying results.

Consensus was not used in the calculation of the legitimacy index for reasons that were described earlier, but I did analyze respondents’ views on this concept, as well its impact on other elements of legitimacy. As described earlier, consensus did not impact respondents’ views on
issues outside of the watershed or their desire to protect local environmental interests. However, consensus did negatively impact views on the importance of national environmental issues, as well as inclusiveness (self-exclusion, particularly) and overall perceived legitimacy as measured by the LI values. In one question it was found that many people felt their watershed grouped lacked the desire to tackle difficult or contentious issues in the watershed, but both consensus and non-consensus groups exhibited this negative trait. These results indicate that watershed collaborations relying heavily on consensus (most watershed groups are consensus-based) suffer from legitimacy problems related to inclusiveness, national environmental issues, and avoidance of contentious or difficult issues.

The weaknesses related to consensus may justify a re-evaluation of the necessity of using this mode of decision-making in watershed collaborations, and in other natural resource collaborations, as well. Due to the interconnections between watersheds, including downstream impacts, it is imperative that watershed groups adequately address larger-scale issues and there is some evidence here that this is not always the case.

Even more problematic from a legitimacy perspective is the tendency for consensus groups to thwart inclusiveness in these watershed organizations. An absence of key stakeholder groups, as found in this research with regard to farmers, national environmental groups, and the federal government -- should be a warning that consensus-based groups may not be the best type for eliciting voluntary compliance of plans and recommendations. At the very least, consensus should be the subject of future research related to its impact on the legitimacy, and hence effectiveness, of watershed collaborations.
Table 7.7 - Summary Results for Threats to Elements of Legitimacy (Survey Questions)

Percentage in Parentheses is based on Respondents who Disagree or Express Doubt (neither category) about the Legitimacy of that Element:

- More than 50% is Very High Threat
- 26-50% is High Threat
- 16-25% is Medium Threat
- Less than 16% is Low Threat

<table>
<thead>
<tr>
<th>Legitimacy Element</th>
<th>Threat Level (Percentage of those Negative or Unsure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountability - Overall</td>
<td>Very High (69%)</td>
</tr>
<tr>
<td>Fairness – Overall</td>
<td>Very High (67%)</td>
</tr>
<tr>
<td>Local Knowledge</td>
<td>Very High (66%)</td>
</tr>
<tr>
<td>Inclusiveness – Few Elected Officials Participate</td>
<td>Very High (57%)</td>
</tr>
<tr>
<td>Inclusiveness – Stakeholder Diversity</td>
<td>High (Farmers, Business Interests National Groups, and Federal Government all underrepresented)</td>
</tr>
<tr>
<td>Representation – Self Identification of Demographic Group</td>
<td>High (Heavy stilt towards higher education and income levels)</td>
</tr>
<tr>
<td>Fairness (Based on Influence of Different Stakeholder Types)</td>
<td>High (High Influence from State and Local Government, Low Influence from Farmers, Business Interests and National Environmental Groups)</td>
</tr>
<tr>
<td>Trust – Increased Over Time</td>
<td>High (41%)</td>
</tr>
<tr>
<td>Legitimacy Element</td>
<td>Threat Level (Percentage of those Negative or Unsure)</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>Representation – Demographic Diversity</td>
<td>High (36%)</td>
</tr>
<tr>
<td>Scientific Expertise</td>
<td>Medium (23%)</td>
</tr>
<tr>
<td>Inclusiveness-Overall</td>
<td>Medium (21%)</td>
</tr>
<tr>
<td>Trust-Overall</td>
<td>Medium (20%)</td>
</tr>
<tr>
<td>Just Outcomes</td>
<td>Medium (19%)</td>
</tr>
<tr>
<td>Transparency-Overall</td>
<td>Low (15%)</td>
</tr>
<tr>
<td>Public Participation</td>
<td>Low (12%)</td>
</tr>
<tr>
<td>Information Exchange, Open and Transparent Process</td>
<td>Low (10% - 14%)</td>
</tr>
<tr>
<td>Representation - Overall</td>
<td>Low (10%)</td>
</tr>
<tr>
<td>Consensus Impacts on Other Elements</td>
<td>Negative Impact on Inclusiveness Positive Impact on Perceived Legitimacy (LI Values)</td>
</tr>
</tbody>
</table>

(B) Conclusions

Despite some successes within the three groups studied here, grave legitimacy problems emerged from both focus group and the survey results that cast serious doubts on the legitimacy,
and hence long-term success of these types of watershed organizations. Considering the heavy reliance on the watershed collaborative paradigm for dealing with non-point source pollution, these potential problems are very troubling and warrant further investigation. This research project was exploratory in nature and hence hardly the final word on this subject, but the problems related to legitimacy discovered in this project point out a serious need for future research on watershed collaborations. There were many successes associated with the three case studies studied here including effective capacity building, strong leadership, coordination of the nested scale approach, and to some extent trust building. But many serious problems emerged from this study. Among these were the difficulty in overcoming historical lack of trust (context), problems with sustaining outcomes, lack of accountability, fragmented land use, scientific uncertainty, unfair processes due to inequitable distribution of resources, exclusion of key stakeholders, and a conflict about proper role of government.

**Accountability and the Role of Government**

The twin elements of accountability and the role of government were two of the most important issues to emerge from this study. These two are interrelated in that accountability is often obtained via government action. This was a hot topic of debate among focus group participants. These two elements were shown to be problematic in the survey results, as well, and the role of government was often poorly defined or absent in the collaborative process of the three watershed groups studied here. A sizable minority of respondents believed that accountability did not exist within their watershed groups, and the prospects for future outcomes
and sustainability of efforts seemed threatened by this lack of accountability. This was especially true in the Poplar Creek watershed of Illinois, the most urbanized watershed of the three.

Because accountability often revolves around governmental regulatory authority, the question emerges about what role government should play in making watershed groups and stakeholders accountable for outcomes. Survey results already illustrated the lack of participation by elected officials, providing pessimism about their role in dealing with the accountability issue. Add in a lack of trust towards governmental agencies in some watersheds, and a complex and challenging problem emerges. Conflicting, contradictory, and uncertain opinions on the proper role of government were noted in both the focus groups and the survey. While many survey respondents and focus group participants expressed distaste for increased regulatory power on the part of government, there were also some who called for increased regulatory power to deal with those abusing the resource. One government scientist and focus group participant even suggested that lack of enforcement of current regulations was a major reason why few people advocated for more government regulations to deal with water quality problems. In other words, why call for more regulations when the ones on the book now are not being enforced?

One possible solution is increased funding which is related to the aforementioned elected officials. Funding was an issue of importance mentioned in the focus groups, as well as in the open-ended questions at the end of the survey. Greater funding improves the interconnected issues of trust and scientific uncertainty, and thus allows for better baseline data and more monitoring stations to detect improvements (or setbacks) with regards to water quality. As mentioned earlier, these efforts cannot be done on the cheap. You cannot have few regulations and low levels of funding at the same time. If the goal is an ideological desire to remove
government from the equation, both with regards to regulation and tax money required, and not to improve the physical and socio-economic conditions in the watershed, the entire collaborative effort will fail miserably. But with more government funds comes the need for more accountability, and I believe it is unwise to direct more taxpayer money to watershed collaborations that avoid direct accountability by that same government.

**Future Research and the Legitimacy Index**

The threats to watershed collaboration described here are the results of limited research on only three watersheds, but appear significant enough to warrant future studies in other watersheds. A more comprehensive survey over a larger geographic area could determine if these problems are widespread or if they are restricted to my selected watersheds. However, given the high quality of leadership and sustained long-term successes that these watersheds have achieved over the years, it is unlikely that similar legitimacy issues would not occur in other watersheds. In fact, I would be surprised if many of these problems were not worse in other watershed organizations.

The legitimacy index derived here was consistent across the three watersheds, and when used as a comparison of the two weighting methods (survey and literature review) should be a useful metric for additional studies over a broader scope of regions and watersheds. Even though the legitimacy index calculated here may be inexact, it also serves as a useful comparison tool when looking at factors such as scale, consensus, watershed type, stakeholder type, and participant status, as well.
People involved in efforts like these (my survey respondents) can often have a more positive perception regarding the success of their watershed groups (cognitive dissonance) than more unbiased, non-participants -- a scenario that only makes these legitimacy issues worse. If legitimacy problems arise from a survey of mostly group participants, imagine what those who are not closely invested in the collaborative process may think. It could reasonably be expected that perceived legitimacy for non-participants will be lower than for group participants. This was confirmed by results that showed group participant status was a factor that significantly affected perceived legitimacy (LI values). Despite the many warnings presented in this research, the watershed groups studied here may actually represent the best-case scenario, and future research over a broader area could uncover larger and possibly different threats to legitimacy. In the meantime, the legitimacy index as developed here can serve as a useful comparison tool in other watersheds, where the historical context and problematic issues could very well be worse than the ones discovered in these watersheds.

**Future of the Collaborative Paradigm and Alternative Strategies**

The same serious problems related to legitimacy found here -- issues of inclusiveness, representation, diversity, fairness, trust, consensus, and accountability -- strengthen the stance of some experts who already question the watershed collaborative paradigm as the primary strategy for improving water quality in the United States. Fragmentation of land-use controls and scientific uncertainty as discovered in this research further complicate efforts to achieve successful watershed collaboration.
One of the most concerted, well-funded, and long-term watershed collaborations in the world is the Chesapeake Bay Watershed Initiative. Water quality in the Chesapeake Bay has not improved significantly over decades of action, and most experts call for a change from the voluntary, collaborative approach now in effect. In a report published by the Environmental Working Group (EWG) titled, "Facing Facts in the Chesapeake Bay" (Perez, Cox, and Cook 2009), the authors cite the conclusions of a group of scientific experts who declared in 2008 that "restoration efforts under the voluntary, collaborative approach currently in place have not worked" and that new "mandatory, enforceable measures" are needed to reduce nutrient and sediment loading from farm sources. The EWG report itself calls this "reliance on a failed voluntary approach" the "primary obstacle" to cleaner water in the Chesapeake Bay. The failure of the collaborative approach in the Chesapeake Bay, despite gargantuan efforts and huge inputs of resources, should bode ill for other watersheds such as the ones studied here -- especially when studies like this uncover significant stumbling blocks for effective cooperation and successful outcomes.

My call for future research should not delay immediate implementation of new methods, possibly utilizing adaptive management to determine what works for improving water quality that has been degraded primarily by non-point sources of pollution. We should no longer automatically accept the idea that collaboration will be effective in reducing non-point source pollution originating over rural and urban landscapes. Time is running out as the waterways of the United States fail to meet water quality standards established decades ago, all while huge amounts of money continue to be allocated to voluntary compliance methods, such as the $188 million set aside for four years in Chesapeake Bay as laid out in the 2008 Farm Bill. Throughout
my study of the Rock, SE Fox, and Poplar Creek watersheds I heard many cries for more funding of collaborative efforts.

But looking at the Chesapeake Bay as an example, we see that adequate funding is no guarantee of success. It may be the case that such funding would be better spent on strict regulatory control of agricultural and urban landscapes as many experts are now advocating, rather than being used as a "carrot" to achieve voluntary compliance in what appears to be a flawed collaborative strategy. It would be interesting to see how much money has been spent so far in collaborative efforts in the three watersheds studied in this paper, and how that compares to the costs of an alternative regulatory approach. Watershed collaborations could involve the use of both “sticks’ in the form of regulations, and “carrots” in the form of continued funding for voluntary implementation of best management practices. Current government payments for ecosystem services such as the Conservation Reserve Program (CRP), the Conservation Security Program (CSP) and the Wetlands Reserve Program (WRP) -- in addition to future payments for carbon sequestration -- would all be useful “carrots” for this purpose. Additional “sticks” could include fertilizer taxes, user-fees, and other pollution taxes.

Collaborative efforts and watershed organizations can continue to serve a role as key institutions for improving water quality, but without the support of strict and uniform regulations for controlling surface runoff these measures may be doomed to failure. Voluntary compliance and best management practices (BMP’s) alone may not succeed, especially when plagued by the types of legitimacy problems discovered in this research. The implementation of BMP’s and other voluntary compliance activities must be backed by strict regulatory control, benchmarks, monitoring, enforcement, and timelines.
If increased regulation is the “stick” used to augment monetary support for water quality programs (“the carrots”), then future watershed collaborations will need greater accountability to government as advocated by Wallington et al. (2008). The question remains, however, as to what should be the relative roles for different levels of government when it comes to monitoring the effectiveness of these efforts. Intertwined with potential governmental authority is the question of watershed-group scale, particularly regarding the most effective roles and jurisdictional territories for these groups.

But examination of watershed model plans such as these ultimately re-address the scale question posed earlier (Loftus, 2008). While the results of this study seem to show that smaller scales are better for watershed planning, it seems that local governments are susceptible to being disproportionately influenced by economic and parochial interests, and possibly lose legitimacy in the process by not always effectively engaging all national stakeholders. The likelihood that economic interests would co-opt the consensus-based model of watershed collaboration at the local level increases when skilled, professional lobbyists become employed to thwart any implementation of plans designed to improve environmental quality. This occurs even when scientific experts deliver sound data and conclusions to the contrary. Lobbyists for business in the local region are often extremely good at obfuscation when arguing against consensus and the implementation of projects to reduce environmental degradation (Dzigiewlski 2013).

Even in cases where critical farm interests are involved in the watershed collaboration process, which was not the case in this study but has been seen in other watersheds such as Hewitt Creek in Iowa (Hewitt Creek Watershed website 2013), agribusiness often uses their participation as a diversion or stalling tactic to prevent any meaningful reductions in nutrient loading. In the meantime they continue with business as usual, despite any perceptions of
serious involvement that accrue from their participation and collaboration (Kraft 2013). For these reasons, I believe the federal government may be more effective in taking on the regulatory role in watershed management than the local authorities.

Despite the effectiveness of federal regulation, however, a reliance of this type of control over local governments becomes threatened on constitutional grounds. Using the federal government as the primary driver of watershed collaborations could end up being legally and politically untenable (McCubbin 2013). One possible solution that would negate the constitutional issues mentioned above would be for the federal government to provide the “carrots in the way of funding, and the local and state governments to employ the “sticks” in the form of increased and more effective regulation. In rural areas such as the watersheds studied in this paper, funding could be acquired through taxes on fertilizer (pennies per pound) or pesticides – but retrievable via grants from the federal government for improving water quality (Lant 2013).

One possible way to coordinate the roles of local, federal, and state governments can be seen in Wisconsin, where local governments were enticed to improve their land records departments with GIS applications via state government assistance. The state of Wisconsin did what the local governments could not do, and passed a law accessing a small six dollar fee on each property transaction that involved a change of ownership. The local governments collected the fees and kept the money if they used it for land records modernization. Otherwise, the state would keep the fees and redistribute the money to other counties that had a land records modernization program. In this manner, the state acts to redistribute the money to smaller counties that may not typically accumulate much in the way of fees. In this particular case in Wisconsin, four dollars of every six collected went to the county (if they instituted land records
modernization), and two went to state to be redistributed back to various counties based on competitive grants (Tulloch et al. 1995).

This example illustrates how the constitutional and legal issues can be avoided by the larger scale government entity, while still encouraging smaller levels of government to be more proactive in dealing with a statewide problem. Perhaps this type of model can be employed for watershed collaborations at the state-wide level. The federal government could entice state and local governments to access a small fertilizer tax on farmers in the region (continuing to use the watershed as the unit of analysis and planning), for example, and allow these entities to keep the money as long as it was applied to projects that improve the physical and biological conditions in the watershed (Rice, 2013).

One study (Ruhl et al. 2003) developed a model watershed plan at the state-level that advocated for many of the measures discussed here: user-fees, pollution taxes, land-use regulation, strict guidelines, benchmarks, and deadlines for improving water quality. In keeping with some of the restrictions, drawbacks, and constitutional problems associated with a federal approach to solving these problems -- this watershed model was state-based, but relied mostly on local governments to set up watershed councils that would enact fees and pollution taxes, along with land-use controls. This approach relied on a “nested” approach for governance in much the same way the collaborative groups studied in my research used a nested-scale approach in their watersheds. This nested approach for governance called for local watershed councils to work with and comply with plans and goals set by a larger-scale, regional, watershed coordination agency, as well as a state watershed management agency.

This type of model would incorporate “carrots” at the state and federal level, while delegating regulatory and taxing authority to the local level, in accordance with the discussion
from above. This three-tiered model would also avoid the political and constitutional problems associated with federal control. Elected politicians at the local level would be in control and ultimately responsible to the voters, a situation that enhances political legitimacy. Appointed officials and bureaucrats at the state level would still provide expertise, scientific data, capacity-building, and funding. This model also saw regional coordination agencies as providing scientific and technical support (Ruhl et al. 2003).

This model is a good one, and is a vast improvement over the present voluntary-only regime to contain and reduce non-point source pollution. It sets up the types of regulations, fees, taxes, benchmarks, and deadlines that are needed to get more effective water quality control. At the same time it maintains local authority and relies on the legitimacy of local governments. The current locally-led groups could be incorporated into this model, and a funding stream from the federal and state levels could continue as a means to implement projects on-the-ground.

However, since this article was written many state-governments have taken a big hit as budgets have become very tight. The authors acknowledge the possible objections to the development of a new layer of government at the state level, and I am afraid the current budgetary and political climate as instigated by the economic collapse of 2008 only intensifies roadblocks to the development of such a new system of governance. In addition, I still have my doubts about the states having ultimate control over non-point source pollution, given the potential for a “race to the bottom” as each state tries to entice business with lower taxes, fees, and regulations. This reluctance is one reason why state water quality efforts were so unsuccessful prior to the passage of the federal Clean Water Act in 1972. Still, some states do act as “leaders” for environmental protection, and California’s efforts to deal with air pollution is a prime example. Once a watershed model such as this is established, it may cause other states to
follow their lead, especially if water quality improves as the same pace that air quality has improved in California.

In any case, a better role for watershed organizations may be as an entity supplement more authoritative, regulatory controls at the local and perhaps state level. Giving government more regulatory sticks to enforce land-use activities and conservation practices that better protect soil and water resources may be necessary in the end. Collaborative groups could aid this effort by educating, informing, and coordinating activities among stakeholders. However, it is foolhardy to rely totally on voluntary-based collaborations to deal with the complex and insidious environmental problem known as non-point source water pollution. Consequentially, collaborative efforts must be only part of a broader and more comprehensive plan that not only aggressively works to head off further degradation of water resources, but is pro-active in its approach to improve the water quality of our lakes and streams.
Figure 7.1 – Will Watershed Collaboration Lead to Better Water Quality for Humans, Animals, and Ecosystems?
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APPENDIX A

QUESTIONS USED TO CALCULATE THE LEGITIMACY INDEX

1. Inclusiveness: "The deliberation process is my watershed is inclusive of all stakeholders" (Section 3, Question 6 – 3.6)
2. Representation Quality: "The representatives in my watershed group effectively represent the interests of their constituents" (Question 3.2)
3. Transparency: "The partnership activities in my watershed are open and transparent to the point whereby all citizens are able to find out what is occurring in their watershed" (Question 5.5)
4. Fairness: "Those with greater resources (money, time, and influence) participate in my watershed group to a larger extent than those with fewer resources." (Question 3.5)
5. Trust: "There is a high level of trust between different stakeholders in my watershed group." (Question 6.1)
6. Accountability: Stakeholders who do not comply with the watershed organization's plans and/or recommendations are generally held accountable by some governmental entity for their action or inaction in my watershed." (Question 6.3)
7. Public Participation: "Watershed partnership activities in my watershed are open to all residents who have a desire to become involved, including the public." (Question 3.7)
8. Just Outcome: "The outcomes (recommendations and/or plans) resulting from watershed partnership deliberations are just and equitable for all interests in my watershed." (Question 4.4)
9. Information Exchange: "Because all stakeholders, including the public, have access to information regarding group activities, the understanding of watershed processes and problems is enhanced." (Question 5.2)
10. Use of Local Knowledge: "Local preferences and knowledge should ultimately prevail, even when they conflict with the judgment of scientific experts." (from Weible, Sabatier, and Lubell, 2004) (Question 5.8)
11. Use of Science: "Scientific experts often look for data which supports their own personal values." (from Weible, Sabatier, and Lubell, 2004) (Question 5.6)
APPENDIX B

ALL SURVEY QUESTIONS

Section 1 – Scale and Structure of Your Watershed Organization

1. Which of the following is the best scale for watershed activities that improve water quality and protect natural resources?
   (a) A scale that roughly encompasses the area of my watershed
   (b) A scale that encompasses an area significantly larger than my watershed
   (c) A scale that encompasses an area significantly smaller than my watershed

2. Which of the following types of watershed organization structures is best for improving water quality and protecting natural resources in the basin?
   (a) A committee that is composed of diverse parts of society that is appointed by local elected officials
   (b) A committee elected by voters living in the area where natural resource concerns exist
   (c) A committee composed of watershed residents or agency personnel who volunteer to participate
   (d) A committee of landowners that are selected through local soil and water conservation districts (Illinois residents) or land conservation districts (Wisconsin)
   (e) A committee of technical experts from local, state, and federal agencies that can provide technical information for the decision makers.
3. From an administrative perspective, does your group report to any of the following government entities listed below? List all that apply.
   (a) None. My group does not report to any other organization
   (b) Local Government Agency
   (c) Regional Government Agency
   (d) State Government Agency
   (e) Educational Institution
   (f) Larger Umbrella Basin Organization

Section 2 – Issues in the Watershed

1. Select up to 6 (or less, if applicable) of the most important water quality issues in your watershed. Please remember the top three water quality issues for the next question.
   (a) Confined Animal Feeding Operations (CAFO’s)
   (b) Farming to the Edge of the Waterways
   (c) Livestock in Streams and Lakes
   (d) Nitrogen Pollution from Agriculture
   (e) Non-Point Source Pollution from Urban or Suburban Sprawl
   (f) PCB’s
   (g) Phosphorous Pollution from Agriculture and Lawns
   (h) Point Source Pollution from Industry
   (i) Point Source Pollution from Municipal Sewage District
   (j) Sedimentation
   (k) Trash from Recreational Waterway Issues

2. Of the 6 most important watershed issues selected earlier, rank the top three issues in order of importance.
   Most Important Issue Second Important Issue Third Important Issue
   (a) Confined Animal Feeding Operations (CAFO’s)
   (b) Farming to the Edge of the Waterways
(c) Livestock in Streams and Lakes
(d) Nitrogen Pollution from Agriculture
(e) Non-Point Source Pollution from Urban or Suburban Sprawl
(f) PCB’s
(g) Phosphorous Pollution from Agriculture and Lawns
(h) Point Source Pollution from Industry
(i) Point Source Pollution from Municipal Sewage District
(j) Sedimentation
(k) Trash from Recreational Waterway Issues

3. Are all of your top three issues being addressed by your watershed organization?
   Yes
   No

4. Select the degree to which you agree or disagree with the following statement?
   “Local environmental issues and concerns are considered important in the deliberation process of my watershed group?”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

5. Select the degree to which you agree or disagree with the following statement?
   “Local environmental issues and concerns are considered important in the deliberation process of my watershed group?
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
6. Select the degree to which you agree or disagree with the following statement?
“The most important issues in my watershed, no matter how contentious, are always
addressed by my watershed organization.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

7. Select the degree to which you agree or disagree with the following statement?
“My watershed organization should consider impacts that may occur outside of the
watershed; not just downstream, but in adjacent basins as well.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree
Section 3 – Participation: Inclusiveness and Representation

1. Select all of the stakeholder groups that are represented in your watershed group, in a formal or informal capacity.
   Commercial Grain Farmer
   Commercial Livestock Farmer
   Commercial Vegetable and/or Fruit Farmer
   Commercial Dairy Farmer
   Educational Institution
   Federal Government Agency
   Grassroots Citizen or Local Environmental Organization
   Industry Representative
   Local Government Agency
   National Environmental Group
   Other Agribusiness
   Other Business Interest
   Real Estate Developer
   Recreation Business Interest
   State Government Agency
   The General Public

2. Select the degree to which you agree or disagree with the following statement?
   “The representatives in my watershed group effectively represent the interests of their constituents.”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree
3. Select up to 5 (or less, if applicable) of the most influential stakeholder groups represented in your watershed organization, in a formal or informal capacity. Please remember the top three for the next question.

   Commercial Grain Farmer
   Commercial Livestock Farmer
   Commercial Vegetable and/or Fruit Farmer
   Commercial Dairy Farmer
   Educational Institution
   Federal Government Agency
   Grassroots Citizen or Local Environmental Organization
   Industry Representative
   Local Government Agency
   National Environmental Group
   Other Agribusiness
   Other Business Interest
   Real Estate Developer
   Recreation Business Interest
   State Government Agency
   The General Public

4. Of the stakeholder groups selected earlier, rank the 3 most influential groups (or fewer, if applicable) in order of importance.

   1. ______________________
   2. ______________________
   3. ______________________
5. Select the degree to which you agree or disagree with the following statement:
“The stakeholder groups in my watershed organization represent demographically diverse groups.”

1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

6. Select the degree to which you agree or disagree with the following statement?
“The deliberation process in my watershed group is inclusive of all stakeholders”

1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

7. Select the degree to which you agree or disagree with the following statement?
“Watershed partnership activities in my watershed are open to all residents who have a desire to become involved”

1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

8. Select the degree to which you agree or disagree with the following statement?
   “Few elected officials participate in my watershed organization, which hinders the legitimacy of our efforts”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

9. Select the degree to which you agree or disagree with the following statement?
   “Those with greater resources (money, time, power, influence)”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

10. Select the degree to which you agree or disagree with the following statement?
    “Landowners in my watershed see more inclusive participation in watershed partnerships as a threat to their property rights”
    1. Strongly Agree
    2. Mostly Agree
    3. Slightly Agree
    4. Neither Agree nor Disagree
    5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

Section 4 – Outcomes: Welfare, Fairness, and Justice

1. Select the degree to which you agree or disagree with the following statement?
   “The plans and/or recommendations implemented as a result of watershed group deliberations increase the well-being of residents in the area”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

2. Select the degree to which you agree or disagree with the following statement?
   “Watershed partnership outcomes (plans and/or recommendations) generally benefit all citizens within the watershed, whether they are represented in the planning process or not”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree
3. Select the degree to which you agree or disagree with the following statement?
“The outcomes (plans and/or recommendations) in my watershed are fair in the treatment of resource owners and users”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

4. Select the degree to which you agree or disagree with the following statement?
“The outcomes (recommendations and/or plans) resulting from watershed partnership deliberations are just and equitable for all interests in my watershed”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

Section 5 – Information Exchange: Role of Science, Local Knowledge, and Outreach

1. Select the degree to which you agree or disagree with the following statement?
   “Information exchange between stakeholders and scientists in my watershed is effective in enhancing understanding of watershed processes and problems”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
2. Select the degree to which you agree or disagree with the following statement?
   “Because of all stakeholders, including the public, have access to information regarding group activities, the understanding of watershed processes and problems is enhanced”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

3. “There is a public campaign for this watershed.”
   Yes
   No

4. Select the degree to which you agree or disagree with the following statement?
   “The public outreach campaign in my watershed is effective”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree
5. Select the degree to which you agree or disagree with the following statement?
“The partnership activities in my watershed are open and transparent to the point whereby all citizens are able to find out what is occurring within the watershed.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

6. Select the degree to which you agree or disagree with the following statement?
“Scientific methods provide the best technique for understanding physical and socio-political issues in the watershed (Weible, Sabatier, and Lubell, 2004).”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

7. Select the degree to which you agree or disagree with the following statement?
“Scientific experts often look for data, which supports their own personal values. (Weible, Sabatier, and Lubell, 2004).”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

8. Select the degree to which you agree or disagree with the following statement?
   “Local preferences and knowledgeable should ultimately prevail, even when they conflict
   with the judgment of scientific experts. (Weible, Sabatier, and Lubell, 2004).”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

9. Select the degree to which you agree or disagree with the following statement?
   “I believe that watershed organizations should rely on stakeholder involvement in the
   beginning to determine which scientific issues should be addressed. (Weible, Sabatier,
   and Lubell, 2004).”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

Section 6 – Elements of Legitimacy – Trust and Accountability

1. Select the degree to which you agree or disagree with the following statement?
   “There is a high level of trust between stakeholders in my watershed.”
   1. Strongly Agree
   2. Mostly Agree

439
2. Select the degree to which you agree or disagree with the following statement?
“The level of trust between different stakeholders has improved since the inception of my watershed groups.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

3. Select the degree to which you agree or disagree with the following statement?
“Stakeholders who do not comply with the watershed organization’s plans and/or recommendations are generally held accountable by some government entity for their action or inaction in my watershed.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

4. “Choose the statement below that best describes your watershed group”
(a) A democratically-driven group run via a participatory voting process
(b) A consensus-based group whereby agreement is required by all participants
(c) An organized hierarchy with a strong central leader and clear direction

Section 7 – Consensus Questions (Only directed at people choosing (b) in 6-4 above)

1. Rate the degree to which your group relies on consensus for decision-making in your watershed
   1. Very Strong Need for Consensus
   2. Strong Need for Consensus
   3. Moderate Need for Consensus
   4. Slight Preference for Consensus

2. Select the degree to which you agree or disagree with the following statement?
   “The consensus model of decision-making used within our watershed group often leads to the exclusion of certain stakeholders because they are perceived as being difficult.”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

3. Select the degree to which you agree or disagree with the following statement?
   “The consensus model of decision-making used within our watershed group often leads to the self-exclusion of certain stakeholders because they become impatient with the time-consuming nature of the process.”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

4. Select the degree to which you agree or disagree with the following statement?
“The consensus model of decision-making used within our watershed group often results
in the avoidance of contentious or controversial issues.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

Section 8 – The Role of Government and Policies

1. Select the degree to which you agree or disagree with the following statement?
“Regardless of the process, resulting plans should only be suggestions (advisory) for
users of natural resources.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree
2. Select the degree to which you agree or disagree with the following statement?
“Regardless of the process, resulting plans should be mandatory for users of natural resources.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

3. Select the degree to which you agree or disagree with the following statement?
“Government has an obligation to establish policies so that natural resources are not degraded or wasted.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

4. Select the degree to which you agree or disagree with the following statement? “The establishment of natural resource policies will enhance the well-being of the citizens of the watershed.”
1. Strongly Agree
2. Mostly Agree
3. Slightly Agree
4. Neither Agree nor Disagree
5. Slightly Disagree
6. Mostly Disagree
7. Strongly Disagree

5. Select the degree to which you agree or disagree with the following statement? “Farmers should be required to implement management plans to protect soil and water resources in order to be eligible for government assistance.”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

Section 9 – The Role of Government and Policies

1. Select the degree to which you agree or disagree with the following statement? “Establishing clearly identifiable goals enhances cooperation and contributes to the success of our watershed’s resource protection efforts.”
   1. Strongly Agree
   2. Mostly Agree
   3. Slightly Agree
   4. Neither Agree nor Disagree
   5. Slightly Disagree
   6. Mostly Disagree
   7. Strongly Disagree

2. Select the degree to which you agree or disagree with the following statement? “The successful implementation of projects resulting from watershed partnership deliberations enhances future collaborative success in our watershed group.”
   1. Strongly Agree
   2. Mostly Agree
Section 10 – Elements of Legitimacy: Rankings

1. Literature review has identified several elements required for legitimate natural resource management, which is listed below. Select the 6 most important elements required for the legitimacy of watershed organizations. Keep the top three in mind for the next question.

   Accountability
   Attainment of Consensus
   Fair and Accessible Information Exchange
   Fair Process for all Stakeholders
   Inclusiveness of the Process
   Just and Equitable Outcomes and Plans
   Public Participation in the Process
   Quality of Representation
   Reliance on Scientific Experts
   Transparency
   Trust among Stakeholders
   Use of Local Knowledge

2. Of the most 6 important elements required for the legitimacy of watershed groups, rank the three most important elements in order of importance. (from 10-2 above)

   First Most Important Element ____________________
Section 11 – Information About You and Your Watershed Group

1. What is your best estimate regarding the size of your watershed

   Small Scale (Less than 100 square miles)
   Medium Scale (100 to 500 square miles)
   Large Scale (Over 500 square miles)

2. Select the stakeholder group that best describes you

   Commercial Dairy Farmer
   Commercial Grain Farmer
   Commercial Livestock Farmer
   Commercial Vegetable and/or Fruit Farmer
   Educational Institution
   Federal Government Agency
   Grassroots Citizen or Local Environmental Group
   Industry Representative
   Local Government Agency
   National Environmental Group
   Other Agribusiness
   Other Business Interest
   Real Estate Developer
   Recreation Business Interest
   State Government Agency
   The General Public
3. Select the ethnic group that best describes you.

White
African-American
Latino
Native American
Asian
Other

4. Select your gender

Male
Female

5. Select your annual income range

Under 10,000 dollars
10,000 to 19,999 dollars
20,000 to 49,999 dollars
50,000 to 74,999 dollars
75,000 to 99,999 dollars
100,000 to 149,999 dollars
150,000 dollars or more

6. Select your education level

No Formal Education
Elementary Education
Graduated Elementary Education
Attended High School
Graduated High School
Attended Community College or Technical School
Attended 4-Year College or University
Graduated College
Attended Graduate School
Received a Professional Degree, M.S., or M.A.
Received a PhD Degree

7. Select your residence type

Rural (outside town limits)
Small Village (<500)
Village (500 to 999)
Small Town (1500 to 2999)
Town (3000 to 19,999)
Small City (20,000 to 99,999)
Large City (100,000 or greater)

8. Are you presently involved in the watershed group for your watershed?

Yes
No

Section 12 – Other Watershed Group Issues

1. List the top three most important factors that increase your watershed group’s survivability over the next five years?

Yes
No
2. Please describe the most significant problems related to governance and/or planning in your watershed organization.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
APPENDIX C

INDICATORS USED IN THE FORMULATION OF HYPOTHESES

ROCK RIVER WATERSHED

Indicators: Lack of Diversity of Participation

“So we haven’t had a very diverse program to this point. It is offered to any citizen but there is not much diversity”

“It’s hard to get the names of people” (let alone a more diverse group)”

“We have more men than women, and we are almost exclusively white – but the residents in our area are almost all white.”

“We have people who are really well educated—and ---people just ---their family has lived there a long time”

“The one area which the department in the basin plan was not successful was the minority population”------don’t have the money------only so much time and energy------so they just don’t have the time and there are driving distances too.”

“We never get the participation we’d really like from farmers, because they work so hard and so many hours. We get some attending the meetings, but is a continuing, ongoing problem to get actual farmers at some of the meetings because their life is so crammed with just making a livelihood.”

“When I have gotten farmers, it’s been part-time farmers who help out their parents, but have another job”

“If you have dairy farmers, you have to do it (meetings) after 8 o’clock at night”

“They (a focus group) particularly wanted to get large scale farmers there. There was only one (who attended). It was a big problem.”
Indicators: Scale and Diversity of Participation

“For that activity (monitoring) the scale seems very effective (small scale group, Friends of Allen Creek - nested within Rock River)”

“I think that is (Friends of Allen Creek) a good size for meetings, too”
“There are things at the small level ----- every once in a while I’d say, you know, I want to be part of one of these small groups because you get local studies, local work done, you’re local. You’re doing your local stream cleanups. You’ve got connections between the people and the resource.”

“95 out of 100 people want to work like, ‘I want to restore streams in my backyard. I want to do the monitoring.’ That’s their interest level. It’s more tangible. It’s right at home. It’s in their backyard.”

It’s more difficult to get people whose natural inclination is to think, ‘How do we fit this thing together at the basin level. And that’s an ongoing challenge for a basin partnership.”

Indicators: Distrust of the DNR and From Farmers in Specific, Hinders Collaborative Efforts

“We’re having trouble getting people to the meetings, and I think they are pretty suspicious. I think they’re worried ----‘they are going to turn on us”

“We paid a consultant to go to farms and do an assessment of their potential groundwater risk. We could only get 2/3 of the people to feel comfortable enough (to allow a follow up and see through recommended changes). It was a combination of NRCS and DNR, but we couldn’t get the trust. I said I’d never do that again. I’d go through one of their (farmers) organizations like the soybeans growers or the corn growers”
“People who aren’t active in the watershed groups, their trust level is dependent on the issue ---- pier ordinance ---- they came out and right away the trust issue came up because they thought, oh you are trying to slip this underneath us without any comments ---- so they assume you are doing something behind their back ---- where all the meetings are open and posted but they don’t happen to see the posting ---- they just come back mad later down the road.”

**Indicators: Enhancing Trust in the Rock River Coalition and Overcoming Past Distrust**

“The Rock River ---- not going to change their minds about the DNR. But, if as a group ---- little project here and there -----we might soften them up a bit.”

“They had 0 trust with the DNR, but over 2 years they got a level of trust that the wastewater treatment plant folks told me they thought they never would get”

“There was a huge problem with the farming community. They had 0 trust for the Rock River Coalition for a while.”

“Because of the work we did ----- policy guidelines which looked seriously at the importance of agriculture, the importance of working to preserve the basin as a type of place we wanted to live in ---- because of the actions we’ve taken.”

“But there was the issue of trust and there was a long time before the people trusted the coalition being in an official partnership with the DNR”

“Because of the work we did ----- policy guidelines which looked seriously at the importance of agriculture, the importance of working to preserve the basin as a type of place we wanted to live in – because of the actions we’ve taken (trust was increased)”

"people who aren't active in the watershed groups, their trust level is dependent on the issue - pier ordinance - they came out and right away the trust issue came up because they thought, oh you are trying to slip this underneath without any comments----so they
assume you are doing something behind their back----where all the meetings are open and posted but they don’t happen to see the posting--they just come mad later down the road."

**Indicators: Time-Consuming Nature of Consensus Reduces Participation**

“Having been in business you think its too time consuming. I was in private business. I feel that would be ‘why aren’t we getting at this and deciding?”

“They (people from a business background) want to move right away. They don’t have the time, they don’t have the patience, and it takes time and patience for consensus decision-making."

“(People) get impatient over time-----they don’t recognize the power of that (consensus), the power of that kind of decision making.”

**Indicators: Consensus Decision-Making Does not Mean Total Unanimity, but rather Consists of a Decision that Everybody Could “Live with”**

“We worked on it until people were okay with it”

“worked on language that wouldn’t alienate those that felt passionate about it”

“So you could go back to your group and said, yeah, yeah, we put that in. I told them it was okay, but I really don’t agree with it, which isn’t really sabotaging it, but it allowed them to save face.”
Indicators: Fair and Inclusive Deliberative Process: Links to Trust, Respect, and Just Outcomes

“It was great to have a neutral party because everybody felt that you were neutral coming in----nobody felt like somebody in the group had a stake (agenda) in the outcome---it was everybody was equal.

“process that made it so excellent

“But I think that pulling together for however long it takes to get something done.”

“They were respectful towards one another.”

“Everybody is respectful and goodwill oriented. They’re all volunteers and they really respect each other.”

“I don’t think anybody would want to step on anybody else’s toes.”

“We have people who have lived in the area a long time and they know everybody and it is great because they are well known and they’re the goodwill type, they’re trusted.”

“_________(local watershed leader) would call people in the watershed and say ‘How are things going-----He’s just listening. OK, OK, OK,------We’re always here if you want to join us.”

Indicators: Leadership and Neutral Facilitators Enhance Watershed Processes

“and still many basins (in WI) have not had basin leaders like _________(Board Member and Government Official)” So, I have always wondered why haven’t they (other basins in WI) joined that and seen the power of that model (strong leader).”
“and you pull together another group-----if you have good vision and can articulate that vision.”

“_____________ (Director and Board Member), because she brings not only personal qualities but significant resources from UW Extension. I think it would be difficult for the organization to continue without the resources of the basin educator, and the resources that UW Extension brings.”

**Indicators: Capacity Building and Legitimacy – Scientific Expertise and Local Knowledge**

“We are a few miles from UW-Whitewater campus. So we have students and professors who are working in our group. We also have a land surveyor working in our group.”

“I think it would be difficult for the organization to continue without the resources of the basin educator.”

**Indicators: Scientific Knowledge and Local Knowledge – Scale Effects and Issues Addressed**

“It’s (Allen Creek Watershed) so tiny I feel like could study it and get a handle on it.”

“We pulled together 30 different communities, municipalities, counties, cities, villages, towns, non-profits, lake districts, to help fund a groundwater flow model. A small group like Allen Creek, that would be outside of what they could do. They could not support it financially but they will be able to utilize the model when it is done.”
“So when you’re looking at bigger collaborations, you need a bigger umbrella except for citizen monitoring.”

“So, there are things you could do at the basin level that you couldn’t do at the small level.”

“For example, other than people in the furthest reaches of the watershed, you don’t control your destiny. You can work locally but if one of the major benefits to your area would be wetland restoration, you could do everything in your small area and it is going to affect your destination”

**Indicators: Education and Outreach - Information Exchange Tools Affect Issues and Scale**

"And you pull together another group --- and if you have good vision and can articulate that vision."

"We had a big article about Lake Ripley. We had a big article about Friends of Allen Creek-----so we can tell the story of little groups but we can also try to keep in front of people some of the bigger issues of collaborative that we're working on."

"I think the idea of a communicative piece and the idea of collaboration is critical for the group."
Indicators: Use of the Nested Scale in the Watershed Approach

"When you work at the scale of the basin you tend to work on bigger issues that cross jurisdictional boundaries."

"So when you're looking at bigger collaborations you need a bigger umbrella except for citizen monitoring."

"So, there are things you could do at the basin level that you couldn't do at the small level."

"There are things at a small level every once in a while I'd say, you know, I want to be part of one of these small groups because you get local studies, local work done----you're local, you're doing local cleanup."

SE FOX WATERSHED

Indicators: Voluntary Participation and Diversity

"They (Southeastern Wisconsin Regional Planning Commission) worked with a lot of communities in the area. They had some from developers, contractor type industry there. They had some agricultural folks there. They have some other citizens who were interested. They had probably 20 or 30 different people on the committee to develop the plan, the overriding SEWRPC plan, and this would take things in more detail."

"I'm thinking of couple of instance where there has been a desire to get a good cross representation of the community involved but maybe not the desire by those invited to participate."

"We will try to get representatives of both sides of the picture"
"So there is a desire to involve different established groups or individuals"

"It's pretty hard to get new members because in most cases the people they're going to are already on some other committee and may have a more narrow interest----."

"I find generally that membership is pretty stable. They're motivated people ----- They really try to get new members because they really want a diversity of opinions."

"Maybe no response, no desire to participate in the committee."

"I can think of another group where it was a watershed plan that was being developed with multiple communities involved, but in both situations, not everyone who was invited to participate decided to participate.

**Indicators: Interest Level and Proximity to the Water**

"The interest is proportional to how close they are to the water."

"The lack of emphasis on how important the lake and the water is to the community ---- I am always amazed they show as little interest as they do, zero interest in the town budget for anything to do with water, yet it is a life source."

"In the case of some ag lands we're (watershed group) going to ask for a percentage of land to plant in nonproductive grass buffer strips, and you know, that's not easy approval to get from the ag base. Yet, it's part of the whole watershed issue. So, it reverts back to the original question---what is the interest? And the interest is the closer to the water, the heavier the interest. The further back, the less the interest."

**Indicators: Conflict and Property Rights**

"It is a nice democratic process, but there is certainly oversight and differences that occur regularly."
"They see these rules as a blockade and many times don't agree with the consensus."

"In my position (with DNR) I would say yes, (in response to a question about experiencing resentment from property owners), but you're dealing with people who want to develop something."

**Indicators: Role of Government, Stakeholder Type, Compliance, and Fragmented Jurisdictions**

"They (Pebble Creek Watershed) might have been trying to pass ordinances for construction site runoff or maybe some kind of development stand in some areas. Maybe they wanted to protect groundwater in some really pretty valuable areas. Just kind of really study the area and try to make some goals and establish some recommendations and objectives out of it for people to look at it and follow. That would be voluntary, and then if there are ordinances involved, compliance for that too."

"We (watershed group) follow everything to the letter legally as far as the DNR is concerned"

"It's a voluntary compliance - usually it's unwittingly, not something they did intentionally. They take care of it. They clean it up."

"A lot of it on the individual's part (of not complying) is a lack of education."

"When you're dealing with developers; that is whole another story.
‘they do what they want"

"You know storm water control is an important issue, and here it is not controlled." Developers take advantage of that."
"The DNR has established a set of regulations and laws they go by, and they enact those. So, many people view them (DNR) as obstructionists, not enablers."

"They (developers) see these rules as a blockade and many times don't agree with the consensus."

"Some people don't agree with any regulation."

"Good mix of regulations and citizen interest"

"The groups that I get involved in----maybe---I'm not talking about a lake shore property owners association. But, by and large, the main comment I hear from them is 'you mean guys (DNR) don't have the authority' to stop this, or 'how could you have allowed this to happen.' You explain to them you don't have the authority. Most ---- the average person---- is really amazed at how little authority the department (DNR) has in almost every issue."

"All those decisions that change land use, we (DNR) have nothing to do with those at all. Then she gets down to----you want to build this pond on a stream. Well, we have no authority over that. So, until you tell people how little authority we have----I just want to mention, we do not have much authority."

"The big complaint I always hear, almost every Lake District I go into, they start out with 'why don’t you do something about the high speed boat use on the lake?' I say, that's your local authority ---- We don't have control over it. They are just amazed."

"By state law the counties must zone shore land areas which is land within 1000 feet of a lake (except for unincorporated areas) --- the county must adopt zoning in shore land areas, a floodplain, or a thousand feet of a lake, and they try to get together with the local municipalities --- that doesn't always happen. I've seen one parcel of land on a lake zoned one way by the county and another by the town."
"We have no storm water control ordinances at the county level. Here's an important issue that is not controlled. You know, storm water control is an important issue, and here is it is not controlled. Developers take advantage of that-----one of the things I wanted to add to your other point was the political activities within the watershed groups becomes more important than one may have thought originally."

"So they didn't go against what SEWRPC (Southeast Wisconsin Regional Planning Commission) said, but they kind of developed if further to give maybe more stringent rules and regulations for something (Pebble Creek Watershed plan in conjunction with SEWRPC). “

"Yes, that's a SEWRPC basin thing developed, because there you have to go through the County Planning and Zoning Department and then ultimately through the Town Planning Board."

"In our county, the county is the ultimate authority."

"I think you're talking about an area here of the most densely populated section of the state, six or seven counties that have the biggest problems with water and watershed; and yet the rules across the state are acted upon without relief.

**Indicators: Role of Government, Stakeholder Type, Compliance, and Fragmented Jurisdictions**

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**Indicators: Capacity Building - Scientific Expertise, Local Knowledge and Education**

**Targeted at the Appropriate Scale Based on the Issue**

"It's an awareness thing, making everybody aware------that you are dealing with a life source."

"and also working with this group (the umbrella group for Waukesha County) to educate the general public on watershed issues."

"I think the Lake District, we're touching on it, has raised awareness."

"There is a knowledge base that my next neighbor who happens to be an accountant doesn’t have."
"The other thing is awareness of the group to make sure that your name is out there and people know you're out there in the first place."

"If we are DNR employees, we have education (task group). I think we do a lot of getting the word out."

"(Awareness) is very big."

"It (Racine Environmental Center) was opened and started by a professor at the University of Wisconsin-Parkside who got a grant to get the thing going."

"If we as DNR employees individually are participating in a watershed group of some sort, a lot of times we are more accepted because we're bringing something to the table."

"My answer would be the smaller the group the better, the more effective they are and the more focused."

"So, all kinds of groups have gotten fired up over that and have been able to do some wonderful things over four or five years. They wouldn't have gotten together without somebody from the larger group organizing them."

**Indicators: The Relationship between Capacity Building and Funding**

"If they come up with a good project like the Fox, there have been several good projects where they needed funding or outside expertise that comes along."

"Like these guys went to the Fox River Commission to get some funding for a project, and you know about them, and they know about you. They come up with a few thousand dollars."

"Money" (in response to my final question about what important topics have I missed.)”
"We've been successful in tapping local corporations and businesses and their foundations and funding ----- we've had one local corporation that has been terrific."

"So private funding is a resource we use quite a bit. Not that the DNR doesn't have a good funding program. It's just that there are a lot of people going to the well."

**POPLAR CREEK WATERSHED**

**Indicators: Capacity Building and Scientific Expertise**

"So, there are advantages to coordination."

"Are we doing this right (asking FREP), does this sound good to you? And they would say 'yes, yes, you are doing great, keep going."

"We felt more confident after learning from them (FREP), to go off on our own and do our own thing."

"So it helps to organize activities around the Fox River or the Fox River Study Group"

"NRCS was involved and providing the first iteration"
"It was a huge advantage --- because you (NRCS) get funding"

"So, it helps to organize activities around the Fox River or the Fox River Study Group. So, the Salt Creek - Dupage Work Group are great examples of a very strong river basin scale organization."

"I think I have support from the village board, I probably do. But, I have a feeling that the whole village is behind this environmental wave at Streamwood."

"And I think Streamwood's plan in the watershed was a good one."
"When NIPC (now CMAP) first started they went through a process where they identified some priorities----"

"but as when we became a group with ______ (CMAP), we had funding potential."

"It was a huge advantage -----because you got NRCS funding"

"(CMAP) secured a 319 grant from IEPA"

"So, the municipalities in the watershed made a kind of match (required for 319 grants) commitment for staff time and that turned out to be a pretty good model"

"Tie-in is strong when we (CMAP) are active, there is some funding."

"The projects are in here and if they reach fruition you knew - if they get a 319 Grand again."

"The Fox (FREP) pulls a lot of attention"

"When municipalities became involved in it, I think what we did was depending on which part of the plan specifically pertained to their community, they each had a bigger say in that part of the plan."

**Indicators: Quality Representation**

"But I would say that Streamwood, Hoffman, Schaumburg; the main people who constantly came to the table; Elgin, they represented the towns and villages all the time in the best interest (of the people)."
“So, if the plan was too grandiose, or if the suggestion for them to commit something long term was going to be too intrusive, too much money, too hard for their community to develop and implement then they voiced that. And we were able to make it much more real, more doable, and did it in incremental steps instead of one giant leap.”

“Nope (in response to a question asking if any representatives had a hidden, personal agenda), that wasn’t the case here.”

“People would have known.” (if representatives had a personal agenda)

**Indicators: Inclusiveness of Government and Village Officials**

"Well, Elgin came in (first municipality to come into the group after it switched from a grassroots group or citizens group to a hybrid group)."

“And this is where ________ made a push because she lives in the area and she had her high school students give presentations to the village board about development and water quality and protection and sustainability and all of these great things. She really paved the way.”

"Well, Elgin came in (first municipality to come into the group after it switched from a grassroots group or citizens group to a hybrid group)."

"Take examples, of like Streamwood. After they kind of got involved there was a lot more communication from Streamwood (government) in this group (PCWC)."

“They (Schaumburg) really liked the idea of doing catch basin inserts. And more retention basin retrofits----to naturalize them. But, I was delighted they (village trustees) took that first step.”

“That was one of the early things we did. The threat, or the fear.”
“We did a lot of education ourselves”

“And that is where _______ really made a push because she really made a push because she lives in the area and she had her high school students give presentations to the village board about development and water quality and protection and sustainability and all of these great things. She really paved the way.”

“I think as _____ said, having a watershed acts as a support base.”

“(Question) And the group, the Poplar Creek Group, helped him (village scientific expert) do that, helped him with the education-outreach part?.”-------- “Right (focus group participant)”

“So we started doing educational programs out on the nature trail to stop destruction of a natural area quickly. And it kind of grew and grew and grew from that. Because no one knew what Poplar Creek Watershed was. And almost everything in Hoffman Estates is named Poplar Creek.”

“They (citizens) really don’t know (about native species cover, wetlands, wildlife areas, etc). It’s sad. Our age of instant technology and instant information, and so many people getting the scare about going green. It’s amazing what little information gets to people.”

“Although our environmental recycle fair once a year in Schaumburg, and we team with Hoffman Estates and our attendance goes way up. And they use it as an outreach-education point.”
Indicators: Trust and Working Together

“And they all have to work together because this one area of land kind of crosses into a few of them but affects them all, so it was nice to have everyone working together.”

(Question) “So there was a high level of trust?” (Answer from participant) “Absolutely!”

“There was like no village secrets that were being hidden from one another.”

“I think at first there was the haves and the have nots.”

“We had made overtures to them for years. But we had been trying to talk to anyone in the community for years during the process. And no one was interested, so sadly, I think their portion of the plan is either very small or just a few lines.”

“We actually got run off (village not cooperating) property a few times, if I recall. And it was kind of an easement and we weren’t trespassing in any way, but I believe some homeowners in the area were skeptical. I think we were asked to leave in a not so polite way.”

“I think if this were a living, breathing plan I would not write them off.”

(Question) “It sounds like that over the 12 year period the level of trust has increases? (Answer from participant) “Yes”

(Question) “So agency involvement has meant giving it legitimacy and helped the level of trust then?” (Answer) “Yes”

“Uncertainty about whether or not this particular area was responsible for the error, or to what degree they might be responsible ---- and we did not have the data resolution to really winnow this out.”
“And he said something about ever since the restaurant mall project on _________ (street name) and _______ (street name). I felt so guilty because that is _________ (name of village where this participant works). I thought, wait a second, we (village where he works) put up erosion control, we are trying to control sediment. He said that one project single handed tipped Poplar Creek over to the bad side. Holy Cow! Really? Just the one project? I remember that. I will never forget it because it just hit me. I did not worry about it too much because we are such a small part of the watershed.”

“Before getting involved in this, _______ (scientific expert from a village in the watershed) was very afraid to ask for new procedures. It might be detrimental to (his/her) ___________. ___________, (another expert) however, was on it for a very long time and they knew each other ------ because money was an issue in _____________(name of village).”

“They (FREP) had lots of questions and corrections and little things like that. I loved their input.”

**Indicators: Accountability and Future Outcomes**

“So, one of the 9 components of the plan does include, that needed to be included, is the notion of measurable progress and goals that the plan sets out to address.”

“How do we generate motivation or enthusiasm or energy? So, the only way this is going to be implemented is if we keep a fire burning under it.”

“It (the plan) sort of loses its momentum.”

“So, there have been genuine attempts at implementing plan recommendations.”

“We just finalized the plan last July. We talked about maybe semi-annual or annual meeting just to keep tabs and like say ---- just to keep it alive.”
“We should actually make a plan that stressed that before somebody steps away from it who was integral to it. And it has limitations to its strategy.”

“Tie-in is strong when we (CMAP) are active, there is some funding.”

“The projects are in here and if they reach fruition you knew – if they get a 319 Grant again.”

**Indicators: Compliance, Government Regulations and Voluntary Collaboration**

“A participant trying to help me rephrase the a question) “Correct me if I’m wrong, I think that what you are trying to get at is ------ This is pretty much a bottom-up, voluntary process – collaborative ---- nobody’s really forced to do anything. Everybody is just getting together as good citizens. So would that (more regulations) take away from any of the goodness that comes bundled with the fact that it is really a voluntary effort?”

“It (lack of enforcement of existing regulations) impacts the quality of the stream bed.”

“So, it’s not so much that you need more regulations, but that you enforce the ones that are on the books.” (Bruce) “I think that’s true for all phases of government. (participant)”
APPENDIX D

SPPS OUTPUTS FOR STATISTICAL TESTS CONDUCTED

Legitimacy Index Tests


**Descriptive Statistics**

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\(^a\) Grouping Variable: Survey = 1, Literature Review = 2

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<tbody>
<tr>
<td>Spearman's rho</td>
<td>Correlation Coefficient</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>49</td>
</tr>
<tr>
<td>Legitimacy Index Using Weights from Literature Review</td>
<td>Correlation Coefficient</td>
<td>.906**</td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>49</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (1-tailed).

3. Legitimacy Index Values (Survey Weights): Differences Between the Three Watersheds: Kruskal-Wallis Test

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Survey Respondents</td>
<td>49</td>
<td>57.6388</td>
<td>7.68885</td>
<td>39.70</td>
<td>73.50</td>
</tr>
<tr>
<td>One of Three Watersheds Used in the Study</td>
<td>49</td>
<td>2.1429</td>
<td>.76376</td>
<td>1.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>
### Ranks

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th>SE Fox Watershed</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dim ensi Rock River</td>
<td>20</td>
<td>23.50</td>
</tr>
<tr>
<td></td>
<td>on1 Poplar Creek</td>
<td>18</td>
<td>23.17</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

### Test Statistics$^{a,b}$

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th>Chi-square</th>
<th>df</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.284</td>
<td>2</td>
<td>.319</td>
</tr>
</tbody>
</table>

*a. Kruskal Wallis Test  
b. Grouping Variable: One of Three Watersheds Used in the Study*
4. Legitimacy Index Values (Literature Review): Differences Between the Three Watersheds: Kruskal-Wallis Test

**Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>(N)</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Literature Review One of Three Watersheds Used in the Study</td>
<td>49</td>
<td>58.7194</td>
<td>8.87421</td>
<td>39.25</td>
<td>77.00</td>
</tr>
</tbody>
</table>

Scale Test Results

1. Scale (Three Levels) and LI Values (Survey Weights): Kruskal-Wallis Test

**Ranks**

<table>
<thead>
<tr>
<th></th>
<th>(N)</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Survey Respondents One of Three Scales - Small, Medium and Large (1,2,3)</td>
<td>1.00</td>
<td>23.42</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>26.07</td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>27.89</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

**Test Statistics\(^{a,b}\)**

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th>(\text{Chi-square df})</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.763</td>
<td>2</td>
<td>.683</td>
</tr>
</tbody>
</table>

\(^{a}\) Kruskal Wallis Test
Test Statistics\textsuperscript{a,b}

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square df</td>
<td>.763</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.683</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Kruskal Wallis Test
\textsuperscript{b} Grouping Variable: One of Three Scales - Small, Medium and Large (1,2,3)

You redo these tables in a more efficient style.

2. Scale (2 Levels) versus Legitimacy Index (LI) – Weights Based on Survey Responses:

Mann Whitney U

<table>
<thead>
<tr>
<th></th>
<th>One of Two Scales - Large versus Small</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Survey Respondents</td>
<td>Small Scale</td>
<td>26</td>
<td>23.42</td>
<td>609.00</td>
</tr>
<tr>
<td></td>
<td>Large Scale</td>
<td>23</td>
<td>26.78</td>
<td>616.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Test Statistics

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>258.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>609.000</td>
</tr>
<tr>
<td>Z</td>
<td>-.821</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.411</td>
</tr>
</tbody>
</table>

a. Grouping Variable: One of Two Scales - Large versus Small

3. Scale (3 Levels) versus Legitimacy Index (LI) – Weights Based on the Literature Review: Kruskal-Wallis Test

### Ranks

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from the Literature Review</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>26</td>
<td>24.25</td>
</tr>
<tr>
<td>2.00</td>
<td>14</td>
<td>24.89</td>
</tr>
<tr>
<td>3.00</td>
<td>9</td>
<td>27.33</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>
### 4. Scale (2 Levels) versus Legitimacy Index (LI) – Weights Based on the Literature Review: Mann-Whitney U Test

#### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The distribution of Legitimacy Index Using Weights from the Literature Review is the same across categories of One of Three Scales - Small, Medium and Large (1,2,3).</td>
<td>Independent-Samples Kruskal-Wallis Test</td>
<td>.855</td>
<td>Retain the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

#### Ranks

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Literature Review</th>
<th>One of Two Scales - Large versus Small</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Scale</td>
<td>26</td>
<td>24.25</td>
<td>630.50</td>
<td></td>
</tr>
<tr>
<td>Large Scale</td>
<td>23</td>
<td>25.85</td>
<td>594.50</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Test Statistics<sup>a</sup>

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>279.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>630.500</td>
</tr>
<tr>
<td>Z</td>
<td>-.391</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.696</td>
</tr>
</tbody>
</table>

<sup>a</sup> Grouping Variable: One of Two Scales - Large versus Small
5. Scale (2 Levels) versus Local Knowledge (2 Levels): Chi-Square Test

### Case Processing Summary

<table>
<thead>
<tr>
<th>Cases</th>
<th>Valid</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Percent</td>
<td>N</td>
<td>Percent</td>
</tr>
<tr>
<td>One of Two Scales -</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large versus Small *</td>
<td>49</td>
<td>50.0%</td>
<td>49</td>
</tr>
<tr>
<td>Local Knowledge -</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two Levels</td>
<td>98</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

### One of Two Scales - Large versus Small * Local Knowledge - Two Levels

**Crosstabulation**

<table>
<thead>
<tr>
<th>One of Two Scales - Large versus Small</th>
<th>Local Knowledge - Two Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Small Scale</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
</tr>
<tr>
<td></td>
<td>17.0</td>
</tr>
<tr>
<td>Large Scale</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
</tr>
<tr>
<td></td>
<td>15.0</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
</tr>
<tr>
<td></td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
</tr>
<tr>
<td></td>
<td>32.0</td>
</tr>
</tbody>
</table>
### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>1.417a</td>
<td>1</td>
<td>.234</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction</td>
<td>.792</td>
<td>1</td>
<td>.374</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>1.434</td>
<td>1</td>
<td>.231</td>
<td>.367</td>
<td>.187</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>1.388</td>
<td>1</td>
<td>.239</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.98.
b. Computed only for a 2x2 table

---

6. **Scale (3 Levels) versus Local Knowledge (3 Levels): Spearman Rank Correlation**

### Correlations

<table>
<thead>
<tr>
<th></th>
<th>Three_Scale</th>
<th>Local_Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>1.000</td>
<td>-.218</td>
</tr>
<tr>
<td>Three_Scale Correlation Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.</td>
<td>.066</td>
</tr>
<tr>
<td>N</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Local_Know Correlation Coefficient</td>
<td>-.218</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td>.066</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>49</td>
<td>49</td>
</tr>
</tbody>
</table>
7. **Scale (3 Levels) versus Issues Outside of the Watershed (3 Levels): Spearman Rank Correlation**

<table>
<thead>
<tr>
<th>Correlations</th>
<th>One of Three Scales - Small, Medium and Large (1,2,3)</th>
<th>Issues Outside the Watershed - Likert Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>Correlation Coefficient Sig. (1-tailed) N</td>
<td>1.000 - .066</td>
</tr>
<tr>
<td>One of Three Scales - Small, Medium and Large (1,2,3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issues Outside the Watershed - Likert Data</td>
<td>Correlation Coefficient Sig. (1-tailed) N</td>
<td>-.066 1.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. **Scale (2 Levels) versus Concern for Impacts (Issues) Outside the Watershed (2 Levels): Chi-Square Test**

<table>
<thead>
<tr>
<th>Case Processing Summary</th>
<th>Cases</th>
<th>Valid</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Percent</td>
<td>N</td>
<td>Percent</td>
</tr>
<tr>
<td>One of Two Scales - Large versus Small * Three Levels of Concern for Impacts Outside the Watershed</td>
<td>49</td>
<td>50.0%</td>
<td>49</td>
<td>50.0%</td>
</tr>
</tbody>
</table>
One of Two Scales - Large versus Small * Three Levels of Concern for Impacts Outside the Watershed

| One of Two Scales | Small Scale | Count | Expected Count | | Large Scale | Count | Expected Count | | Total | Count | Expected Count |
|-------------------|-------------|-------|----------------|| Scale | | | | | | | |
| - Large versus Small | | 11 | 11.1 | 15 | 14.9 | 26 | 26.0 | 26 | 2.00 | 3.00 | Total |
| | | 10 | 9.9 | 13 | 13.1 | 23 | 23.0 | 23 | Total |

Chi-Square Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.007&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>.934</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.000</td>
<td>1</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.007</td>
<td>1</td>
<td>.934</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.581</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.007</td>
<td>1</td>
<td>.935</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.86.
b. Computed only for a 2x2 table
Consensus Test Results

1. Consensus (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

<table>
<thead>
<tr>
<th>Ranks</th>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Survey Respondents</td>
<td>.00</td>
<td>27</td>
<td>27.91</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>6</td>
<td>11.00</td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>11</td>
<td>23.68</td>
</tr>
<tr>
<td></td>
<td>4.00</td>
<td>5</td>
<td>29.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

Test Statistics\textsuperscript{a,b}

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
<td>7.364</td>
</tr>
<tr>
<td>df</td>
<td>3</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.061</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Kruskal Wallis Test  
\textsuperscript{b} Grouping Variable: Five Levels of Consensus Is this a one-way test statistics??
Pairwise Comparisons of the 4 Levels of Consensus and Legitimacy Index (Survey Weights):

**Mann Whitney U Test**

<table>
<thead>
<tr>
<th>Ranks</th>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>.00</td>
<td>27</td>
<td>18.85</td>
<td>509.00</td>
</tr>
<tr>
<td>Using Weights from Survey Respondents</td>
<td>dimension1 2.00</td>
<td>6</td>
<td>8.67</td>
<td>52.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Test Statistics**

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>31.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>52.000</td>
</tr>
<tr>
<td>Z</td>
<td>-2.334</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.020</td>
</tr>
<tr>
<td>Exact Sig. [2*(1-tailed Sig.)]</td>
<td>.018&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Not corrected for ties.

<sup>b</sup> Grouping Variable: Five Levels of Consensus

---

**Ranks**

<table>
<thead>
<tr>
<th></th>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>.00</td>
<td>27</td>
<td>20.69</td>
<td>558.50</td>
</tr>
<tr>
<td>Using Weights from Survey Respondents</td>
<td>dimension1 3.00</td>
<td>11</td>
<td>16.59</td>
<td>182.50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Test Statistics

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>116.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>182.500</td>
</tr>
<tr>
<td>Z</td>
<td>-1.030</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.303</td>
</tr>
<tr>
<td>Exact Sig. [2*(1-tailed Sig.)]</td>
<td>.308&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### Ranks

<table>
<thead>
<tr>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>.00</td>
<td>27</td>
<td>16.37</td>
</tr>
<tr>
<td>Using Weights from</td>
<td></td>
<td></td>
<td>442.00</td>
</tr>
<tr>
<td>dimension1</td>
<td>4.00</td>
<td>5</td>
<td>17.20</td>
</tr>
<tr>
<td>Survey Respondents</td>
<td></td>
<td></td>
<td>86.00</td>
</tr>
</tbody>
</table>

### Test Statistics

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>64.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>442.000</td>
</tr>
<tr>
<td>Z</td>
<td>-.182</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.856</td>
</tr>
<tr>
<td>Exact Sig. [2*(1-tailed Sig.)]</td>
<td>.880&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
### Ranks

<table>
<thead>
<tr>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>2.00</td>
<td>6</td>
<td>5.17</td>
</tr>
<tr>
<td>Using Weights from</td>
<td>3.00</td>
<td>11</td>
<td>11.09</td>
</tr>
<tr>
<td>Survey Respondents</td>
<td>Total</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

### Test Statistics

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mann-Whitney U</td>
</tr>
<tr>
<td></td>
<td>Wilcoxon W</td>
</tr>
<tr>
<td></td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>Asymp. Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>Exact Sig. [2*(1-tailed Sig.)]</td>
</tr>
</tbody>
</table>

---

### Ranks

<table>
<thead>
<tr>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>2.00</td>
<td>6</td>
<td>4.17</td>
</tr>
<tr>
<td>Using Weights from</td>
<td>4.00</td>
<td>5</td>
<td>8.20</td>
</tr>
<tr>
<td>Survey Respondents</td>
<td>Total</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Test Statistics(^b)</td>
<td>Legitimacy Index Using Weights from Survey Respondents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mann-Whitney U</td>
<td>4.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>25.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>-2.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.045</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exact Sig. [2*(1-tailed Sig.)]</td>
<td>.052(^a)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ranks</th>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using Weights from</td>
<td>dimension1</td>
<td>3.00</td>
<td>11</td>
<td>8.00</td>
</tr>
<tr>
<td>Survey Respondents</td>
<td>Total</td>
<td>4.00</td>
<td>5</td>
<td>9.60</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Statistics(^b)</th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>22.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>88.000</td>
</tr>
<tr>
<td>Z</td>
<td>-.623</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.533</td>
</tr>
<tr>
<td>Exact Sig. [2*(1-tailed Sig.)]</td>
<td>.583(^a)</td>
</tr>
</tbody>
</table>

\(^a\) Grouping Variable: Five Levels of Consensus
2. Consensus (4 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test

<table>
<thead>
<tr>
<th>Ranks</th>
<th>Five Levels of Consensus</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from the Literature Review</td>
<td>dimension1 3.00</td>
<td>11</td>
<td>23.68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>dimension1 4.00</td>
<td>5</td>
<td>30.30</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

Test Statistics\textsuperscript{a,b}

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from the Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
<td>4.743</td>
</tr>
<tr>
<td>df</td>
<td>3</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.192</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Kruskal Wallis Test
\textsuperscript{b} Grouping Variable: Five Levels of Consensus
3. Consensus (2 Levels – yes or no) versus Legitimacy Index (Survey Weights): Mann Whitney U Test

Table 6.6 – Descriptive Statistics – Mann-Whitney U Test - Consensus versus LI Values

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimu m</th>
<th>Maximu m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>49</td>
<td>57.6388</td>
<td>7.68885</td>
<td>39.70</td>
<td>73.50</td>
</tr>
<tr>
<td>Using Weights from</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey Respondents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus Groups</td>
<td>49</td>
<td>1.5510</td>
<td>.50254</td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Versus Non-Consensus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.9 – Sum of Ranks – Mann-Whitney U Test – Consensus versus LI Values

<table>
<thead>
<tr>
<th></th>
<th>Consensus Groups Versus Non-Consensus Groups</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>Consensus Based</td>
<td>22</td>
<td>21.43</td>
<td>471.50</td>
</tr>
<tr>
<td>Using Weights from</td>
<td>Non-Consensus Based</td>
<td>27</td>
<td>27.91</td>
<td>753.50</td>
</tr>
<tr>
<td>Survey Respondents</td>
<td>Total</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.10 – Sum of Ranks – Mann-Whitney U Test – Consensus versus LI Values

<table>
<thead>
<tr>
<th>Test Statistics&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>218.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>471.500</td>
</tr>
<tr>
<td>Z</td>
<td>-1.578</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.115</td>
</tr>
</tbody>
</table>

<sup>a</sup> Grouping Variable: Consensus Groups Versus Non-Consensus Groups

4. Consensus (2 Levels – yes or no) versus Legitimacy Index (Literature Weights): Mann Whitney U Test

<table>
<thead>
<tr>
<th>Ranks</th>
<th>Consensus Groups Versus Non-Consensus Groups</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from the Literature Review</td>
<td>Consensus Based</td>
<td>2</td>
<td>22.59</td>
<td>497.00</td>
</tr>
<tr>
<td></td>
<td>Non-Consensus Based</td>
<td>2</td>
<td>26.96</td>
<td>728.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>
### Test Statistics

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from the Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>244.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>497.000</td>
</tr>
<tr>
<td>Z</td>
<td>-1.066</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.287</td>
</tr>
</tbody>
</table>

*a. Grouping Variable:
Consensus Groups Versus Non-Consensus Groups*

### 5. Spearman Rank Correlation – 4 Levels of Consensus vs. LI - Survey

#### Correlations

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th>Five Levels of Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>Correlation 1.000</td>
<td>-.123</td>
</tr>
<tr>
<td></td>
<td>Coefficient Sig. (1-tailed)</td>
<td>.200</td>
</tr>
<tr>
<td></td>
<td>N 49</td>
<td>49</td>
</tr>
<tr>
<td>Five Levels of Consensus</td>
<td>Correlation -.123</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Coefficient Sig. (1-tailed)</td>
<td>.200</td>
</tr>
<tr>
<td></td>
<td>N 49</td>
<td>49</td>
</tr>
</tbody>
</table>
6. Spearman Rank Correlation – 4 Levels of Consensus vs. LI – Literature Review Weights

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
<th>Five Levels of Consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman’s rho</td>
<td>Correlation Coefficient</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>49</td>
</tr>
<tr>
<td>Five Levels of Consensus</td>
<td>Correlation Coefficient</td>
<td>-.063</td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed)</td>
<td>.333</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>49</td>
</tr>
</tbody>
</table>

7. Consensus (2 Levels – yes or no) versus Concerns for Impacts Outside of the Watershed: Chi-Square

Consensus Groups Versus Non-Consensus Groups * Three Levels of Concern for Impacts Outside the Watershed Crosstabulation

<table>
<thead>
<tr>
<th></th>
<th>Three Levels of Concern for Impacts Outside the Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.00</td>
</tr>
<tr>
<td>Consensus Groups Versus Non-Consensus Groups</td>
<td>Count</td>
</tr>
<tr>
<td>Consensus Based</td>
<td>9</td>
</tr>
<tr>
<td>Non-Consensus Based</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Value</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
</tr>
<tr>
<td>Pearson Chi-Square</td>
<td>.062&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Continuity Correction&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.062</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>.061</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>49</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
</tr>
</tbody>
</table>

Chi-Square Tests

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.43.
b. Computed only for a 2x2 table

8. **Consensus (2 Levels – yes or no) versus addressing All Important Issues (2 Levels): Chi-Square**

<table>
<thead>
<tr>
<th>Consensus Versus Non-Consensus * Most Important Issues Addressed - 2 Levels Crosstabulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Consensus Versus Non-Consensus</strong></td>
</tr>
<tr>
<td><strong>Count</strong></td>
</tr>
<tr>
<td>Consensus Based Count</td>
</tr>
<tr>
<td>Consensus Count</td>
</tr>
<tr>
<td>Non-Consensus Based Count</td>
</tr>
<tr>
<td>Non-Consensus Count</td>
</tr>
<tr>
<td>Total Count</td>
</tr>
<tr>
<td>Expected Count</td>
</tr>
</tbody>
</table>
### Chi-Square Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.212a</td>
<td>1</td>
<td>.646</td>
<td>.005</td>
<td>.943</td>
</tr>
<tr>
<td>Correction</td>
<td>.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.214</td>
<td>1</td>
<td>.644</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>.214</td>
<td>1</td>
<td></td>
<td>.715</td>
<td>.476</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.207</td>
<td>1</td>
<td>.649</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.59.
b. Computed only for a 2x2 table

9. **Consensus (2 Levels – yes or no) versus Protection of Local Environmental Interests (2 Levels): Chi-Square**

Consensus Versus Non-Consensus * Environmental Interests - Local Crosstabulation

<table>
<thead>
<tr>
<th></th>
<th>Environmental Interests - Local</th>
<th>Environmental Interests - Local</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
<td>2.00</td>
<td>Total</td>
</tr>
<tr>
<td>Consensus Versus Non-Consensus</td>
<td>Consensus Based</td>
<td>Count</td>
<td>Expected Count</td>
</tr>
<tr>
<td></td>
<td>Non-Consensus Based</td>
<td>Count</td>
<td>Expected Count</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>Expected Count</td>
<td>1</td>
</tr>
</tbody>
</table>

494
### Chi-Square Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.832(^a)</td>
<td>1</td>
<td>.362</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction(^b)</td>
<td>.000</td>
<td>1</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>1.209</td>
<td>1</td>
<td>.272</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td>1.000</td>
<td>.551</td>
<td></td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.815</td>
<td>1</td>
<td>.367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) 2 cells (50.0\%) have expected count less than 5. The minimum expected count is .45.

\(^b\) Computed only for a 2x2 table

10. Consensus (2 Levels – yes or no) versus Protection of National Environmental Interests (2 Levels): Chi-Square

### Consensus Versus Non-Consensus * Environmental Interests - National

<table>
<thead>
<tr>
<th></th>
<th>Environmental Interests - National</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Consensus Versus Non-Consensus</td>
<td>Count</td>
</tr>
<tr>
<td>Consensus Based</td>
<td>8</td>
</tr>
<tr>
<td>Non-Consensus Based</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

\(^b\) Computed only for a 2x2 table
### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.832^a</td>
<td>1</td>
<td>.362</td>
<td>1.000</td>
<td>.551</td>
</tr>
<tr>
<td>Continuity Correction^b</td>
<td>.000</td>
<td>1</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>1.209</td>
<td>1</td>
<td>.272</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td>1.000</td>
<td>.551</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.815</td>
<td>1</td>
<td>.367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .45.

<table>
<thead>
<tr>
<th>Expected Count</th>
<th>16.0</th>
<th>33.0</th>
<th>49.0</th>
</tr>
</thead>
</table>

### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.250^a</td>
<td>1</td>
<td>.617</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction^b</td>
<td>.038</td>
<td>1</td>
<td>.846</td>
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<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.249</td>
<td>1</td>
<td>.617</td>
<td></td>
<td>.761</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
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<tr>
<td>Linear-by-Linear Association</td>
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<td>1</td>
<td>.621</td>
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<tr>
<td>N of Valid Cases</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.18.
11. Consensus (2 Levels – yes or no) versus Inclusiveness (2 Levels): Chi-Square

### Consensus Versus Non-Consensus * Inclusiveness - Two Levels

#### Crosstabulation

<table>
<thead>
<tr>
<th>Consensus Versus Non-Consensus</th>
<th>Inclusiveness - Two Levels</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Consensus Based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consensus Count</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Expected Count</td>
<td>5.4</td>
<td>16.6</td>
</tr>
<tr>
<td>Non-Consensus Based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>Expected Count</td>
<td>6.6</td>
<td>20.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
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<tr>
<td>Count</td>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>Expected Count</td>
<td>12.0</td>
<td>37.0</td>
</tr>
</tbody>
</table>

#### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>1.160a</td>
<td>1</td>
<td>.282</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction</td>
<td>.552</td>
<td>1</td>
<td>.458</td>
<td></td>
<td></td>
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<tr>
<td>Likelihood Ratio</td>
<td>1.156</td>
<td>1</td>
<td>.282</td>
<td>.331</td>
<td>.228</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>1.136</td>
<td>1</td>
<td>.287</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. Consensus (2 Levels – yes or no) versus Inclusiveness (7 Levels - Likert Scores): Mann Whitney U Test

Test Statistics\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Inclusive of All Stakeholders - Likert Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>225.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>478.000</td>
</tr>
<tr>
<td>Z</td>
<td>-1.505</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.132</td>
</tr>
</tbody>
</table>

\(^a\) Grouping Variable: Consensus Versus Non-Consensus

Ranks

<table>
<thead>
<tr>
<th></th>
<th>Consensus Versus Non-Consensus</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusive of All Stakeholders - Likert Data</td>
<td>Consensus Based</td>
<td>22</td>
<td>21.73</td>
<td>478</td>
</tr>
<tr>
<td></td>
<td>Non-Consensus Based</td>
<td>27</td>
<td>27.67</td>
<td>747</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. Consensus (2 Levels) versus Few Elected Officials Participate (2 Levels): Chi-Squared Test

Case Processing Summary

<table>
<thead>
<tr>
<th></th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
</tbody>
</table>
### Case Processing Summary

<table>
<thead>
<tr>
<th>Cases</th>
<th>Valid</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Percent</td>
<td>N</td>
</tr>
<tr>
<td>Few Elected Officials Participate * One of Three Watersheds Used in the Study</td>
<td>49</td>
<td>50.0%</td>
<td>49</td>
</tr>
</tbody>
</table>

### Few Elected Officials Participate * One of Three Watersheds Used in the Study Crosstabulation

<table>
<thead>
<tr>
<th></th>
<th>SE Fox Watershed</th>
<th>Rock River</th>
<th>Poplar Creek</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few Elected Officials Participate</td>
<td>1.00 Count</td>
<td>5</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>4.3</td>
<td>7.8</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>2.00 Count</td>
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<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>6.7</td>
<td>12.2</td>
<td>11.0</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>11</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>11.0</td>
<td>20.0</td>
<td>18.0</td>
</tr>
</tbody>
</table>

### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>.444a</td>
<td>2</td>
<td>.801</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.445</td>
<td>2</td>
<td>.801</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.433</td>
<td>1</td>
<td>.510</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 1 cells (16.7%) have expected count less than 5.
The minimum expected count is 4.27.
Demographic Diversity (Participatory Diversity) Test Results

1. Income (7 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

**Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>49</td>
<td>57.64</td>
<td>8.76885</td>
<td>39.70</td>
<td>73.50</td>
</tr>
<tr>
<td>Income - Seven Levels</td>
<td>44</td>
<td>4.50</td>
<td>1.43867</td>
<td>1.00</td>
<td>7.00</td>
</tr>
</tbody>
</table>

**Ranks**

<table>
<thead>
<tr>
<th>Income - Seven Levels</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>1.00</td>
<td>1 25.00</td>
</tr>
<tr>
<td>Using Weights from Survey</td>
<td>2.00</td>
<td>2 24.50</td>
</tr>
<tr>
<td>Respondents</td>
<td>3.00</td>
<td>8 24.75</td>
</tr>
<tr>
<td>dimension1</td>
<td>4.00</td>
<td>11 22.73</td>
</tr>
<tr>
<td></td>
<td>5.00</td>
<td>11 17.09</td>
</tr>
<tr>
<td></td>
<td>6.00</td>
<td>7 26.86</td>
</tr>
<tr>
<td></td>
<td>7.00</td>
<td>4 23.00</td>
</tr>
<tr>
<td>Total</td>
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<td></td>
</tr>
</tbody>
</table>
2. Income (7 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test

### Test Statistics\(^{a,b}\)

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square df</td>
<td>3.098</td>
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<tr>
<td>df</td>
<td>6</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.797</td>
</tr>
</tbody>
</table>

\(^{a}\) Kruskal Wallis Test  
\(^{b}\) Grouping Variable: Income - Seven Levels

### Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Literature Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income - Seven Levels</td>
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<td>58.7194</td>
<td>8.87421</td>
<td>39.25</td>
<td>77.00</td>
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<tr>
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<td>4.5000</td>
<td>1.43867</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Income - Seven Levels</td>
<td>N</td>
<td>Mean Rank</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>---</td>
<td>-----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legitimacy Index Using Weights from Literature Review</td>
<td>1.00</td>
<td>1</td>
<td>18.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>2</td>
<td>26.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>8</td>
<td>22.88</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>4.00</td>
<td>11</td>
<td>23.14</td>
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<tr>
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<td>5.00</td>
<td>11</td>
<td>19.91</td>
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<tr>
<td></td>
<td>6.00</td>
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<td>26.21</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>7.00</td>
<td>4</td>
<td>19.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
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**Test Statistics**

<table>
<thead>
<tr>
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<td>Asymp. Sig.</td>
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</table>

a. Kruskal Wallis Test  
b. Grouping Variable: Income - Seven Levels
3. Income (7 Levels) versus Legitimacy Index (Survey Weights): Spearman Rank Correlation

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th>Income - Seven Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>Correlation</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Coefficient</td>
<td>-.038</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.908</td>
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<td></td>
<td>N</td>
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</tr>
</tbody>
</table>

4. Income (7 Levels) versus Legitimacy Index (Literature Review Weights): Spearman Rank Correlation

<table>
<thead>
<tr>
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<th>Legitimacy Index Using Weights from Literature Review</th>
<th>Income - Seven Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>Correlation</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Coefficient</td>
<td>-.018</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.806</td>
</tr>
<tr>
<td></td>
<td>N</td>
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</tr>
<tr>
<td>Income - Seven Levels</td>
<td>Correlation Coefficient</td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>-.018</td>
<td>.906</td>
</tr>
<tr>
<td></td>
<td>1.000</td>
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</table>

5. Education (5 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

<table>
<thead>
<tr>
<th>Education Five Levels</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>4</td>
<td>29.75</td>
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<tr>
<td>Using Weights from</td>
<td>17</td>
<td>22.41</td>
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<tr>
<td>Survey Respondents</td>
<td>7</td>
<td>30.29</td>
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<tr>
<td>dimension1</td>
<td>14</td>
<td>21.57</td>
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<tr>
<td>5.00</td>
<td>6</td>
<td>27.00</td>
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<tr>
<td>Total</td>
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</tbody>
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Test Statistics\textsuperscript{a,b}

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square df</td>
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<tr>
<td>Asymp. Sig.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<tbody>
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<td>df</td>
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<td>Asymp. Sig.</td>
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</tbody>
</table>

\textsuperscript{a} Kruskal Wallis Test  
\textsuperscript{b} Grouping Variable: Education Five Levels
6. Education (5 Levels) versus Legitimacy Index (Literature Review Weights):
   Kruskal-Wallis Test

<table>
<thead>
<tr>
<th>Ranks</th>
<th>Education Five Levels</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index 1.00</td>
<td>4</td>
<td>29.75</td>
<td></td>
</tr>
<tr>
<td>Using Weights from 2.00</td>
<td>17</td>
<td>23.65</td>
<td></td>
</tr>
<tr>
<td>Literature Review dimension 3.00</td>
<td>7</td>
<td>27.29</td>
<td></td>
</tr>
<tr>
<td>4.00</td>
<td>14</td>
<td>22.86</td>
<td></td>
</tr>
<tr>
<td>5.00</td>
<td>6</td>
<td>24.00</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test Statistics\(^{a,b}\)

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square df</td>
<td>1.104</td>
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<tr>
<td>Asymp. Sig.</td>
<td>.894</td>
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</table>

\(^{a}\) Kruskal Wallis Test
7. Residence Type (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

<table>
<thead>
<tr>
<th>Residence Type</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>11</td>
<td>29.27</td>
</tr>
<tr>
<td>Using Weights from</td>
<td>11</td>
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<td>18</td>
<td>23.94</td>
</tr>
<tr>
<td>Total</td>
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<td></td>
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</tbody>
</table>

Test Statistics\(^{a,b}\)

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
<td>2.543</td>
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<tr>
<td>df</td>
<td>3</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.468</td>
</tr>
</tbody>
</table>

8. Residence Type (4 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test

<table>
<thead>
<tr>
<th>Residence Type</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>11</td>
<td>28.82</td>
</tr>
<tr>
<td>Using Weights from</td>
<td>11</td>
<td>25.27</td>
</tr>
<tr>
<td>dimenson1</td>
<td>18</td>
<td>24.72</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>
Test Statistics\textsuperscript{a,b}

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
<td>3.383</td>
</tr>
<tr>
<td>df</td>
<td>3</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.336</td>
</tr>
</tbody>
</table>

a. Kruskal Wallis Test
b. Grouping Variable: Residence Type

9. Stakeholder Group (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>49</td>
<td>57.638</td>
<td>8.76885</td>
<td>39.70</td>
<td>73.50</td>
</tr>
<tr>
<td>Using Weights from Survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder_4_Groups</td>
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<td>.00</td>
<td>4.00</td>
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### Ranks

<table>
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<tr>
<th>Stakeholder_4_Groups</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Survey dimension1 Respondents</td>
<td>4</td>
<td>35.00</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>24.80</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

### Test Statistics<sup>a,b</sup>

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
<th>Chi-square</th>
<th>df</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3.304</td>
<td>3</td>
<td>.347</td>
</tr>
</tbody>
</table>

<sup>a</sup> Kruskal Wallis Test  
<sup>b</ sup> Grouping Variable: Stakeholder_4_Groups

10. Stakeholder Group (4 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test
### Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>49</td>
<td>58.719</td>
<td>8.87421</td>
<td>39.25</td>
<td>77.00</td>
</tr>
<tr>
<td>Using Weights from</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder_4_Groups</td>
<td>49</td>
<td>1.9592</td>
<td>.93450</td>
<td>.00</td>
<td>4.00</td>
</tr>
</tbody>
</table>

### Ranks

<table>
<thead>
<tr>
<th>Stakeholder_4_Groups</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>1.00</td>
<td>14 23.14</td>
</tr>
<tr>
<td>Using Weights from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature Review</td>
<td>2.00</td>
<td>25 24.48</td>
</tr>
<tr>
<td>dimension1</td>
<td>3.00</td>
<td>4 31.63</td>
</tr>
<tr>
<td></td>
<td>4.00</td>
<td>5 22.70</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
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</tbody>
</table>

### Test Statistics\(^{a,b}\)

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
<td>1.251</td>
</tr>
<tr>
<td>df</td>
<td>3</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.741</td>
</tr>
</tbody>
</table>

\(^a\) Kruskal Wallis Test
### Test Statistics\(^a,b\)

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square df</td>
<td>1.251</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.741</td>
</tr>
</tbody>
</table>

a. Kruskal Wallis Test  
b. Grouping Variable: Stakeholder_4_Groups

11. Stakeholder Type (2 Levels) versus Legitimacy Index (Literature Review Weights): 
Mann-Whitney U Test

<table>
<thead>
<tr>
<th></th>
<th>Stakeholder Group - Two Levels</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index</td>
<td>1.00</td>
<td>23</td>
<td>27.35</td>
<td>629.00</td>
</tr>
<tr>
<td>Using Weights from Survey Respondents</td>
<td>dimension1 2.00</td>
<td>25</td>
<td>21.88</td>
<td>547.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Statistics&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Legitimacy Index Using Weights from Survey Respondents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mann-Whitney U</td>
<td>222.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>547.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>-1.352</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.176</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Grouping Variable: Stakeholder Group - Two Levels
12. Stakeholder Type (2 Levels) versus Legitimacy Index (Literature Review Weights):
Mann-Whitney U Test

### Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Literature Review Stakeholder Group - Two Levels</td>
<td>49</td>
<td>58.7194</td>
<td>8.87421</td>
<td>39.25</td>
<td>77.00</td>
</tr>
<tr>
<td>Stakeholder Group - Two Levels</td>
<td>49</td>
<td>1.4898</td>
<td>.54476</td>
<td>.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

### Ranks

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legitimacy Index Using Weights from Literature Review</td>
<td>1.00</td>
<td>23</td>
<td>564.00</td>
</tr>
<tr>
<td>dimension1</td>
<td>2.00</td>
<td>25</td>
<td>612.00</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

### Test Statistics\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>287.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>612.000</td>
</tr>
<tr>
<td>Z</td>
<td>-.010</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.992</td>
</tr>
</tbody>
</table>
### Test Statistics

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>287.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>612.000</td>
</tr>
<tr>
<td>Z</td>
<td>-.010</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.992</td>
</tr>
</tbody>
</table>

a. Grouping Variable:
Stakeholder Group - Two Levels

### Ranks

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Survey Respondents (dimension1)</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Watershed Group Participant</td>
<td>16</td>
<td>19.47</td>
<td>311.50</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>27.02</td>
<td>864.50</td>
</tr>
</tbody>
</table>

13. **Group Participant Status (2 Levels) versus Legitimacy Index (Survey Weights): Mann-Whitney U Test**
### Test Statistics\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Survey Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>175.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>311.500</td>
</tr>
<tr>
<td>Z</td>
<td>-1.761</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.078</td>
</tr>
</tbody>
</table>

\(^a\) Grouping Variable: Active Watershed Group Participant

### Ranks

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Literature Review</th>
<th>Active Watershed Group Participant</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>16</td>
<td>19.22</td>
<td>307.50</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>32</td>
<td>27.14</td>
<td>868.50</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>27.14</td>
<td>868.50</td>
<td></td>
</tr>
</tbody>
</table>

### Test Statistics\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Legitimacy Index Using Weights from Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>171.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>307.500</td>
</tr>
<tr>
<td>Z</td>
<td>-1.849</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.065</td>
</tr>
</tbody>
</table>

14. **Group Participant Status (2 Levels) versus Legitimacy Index (Literature Review Weights): Mann-Whitney U Test**
**Test Statistics**

<table>
<thead>
<tr>
<th>Legitimacy Index Using Weights from Literature Review</th>
<th>Mann-Whitney U</th>
<th>Wilcoxon W</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>171.500</td>
<td>307.500</td>
<td>-1.849</td>
<td>.065</td>
</tr>
</tbody>
</table>

a. Grouping Variable: Active Watershed Group Participant

15. Trust (2 Levels) versus Watershed (3 Levels): Chi-Square Test

**One of Three Watersheds Used in the Study * Trust_2_Levels Crosstabulation**

<table>
<thead>
<tr>
<th>One of Three Watersheds Used in the Study</th>
<th>Trust_2_Levels</th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00</td>
<td>2.00</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>SE Fox Watershed</td>
<td>Count</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>7.8</td>
<td>4.2</td>
<td>12.0</td>
</tr>
<tr>
<td>Rock River</td>
<td>Count</td>
<td>12</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>12.4</td>
<td>6.6</td>
<td>19.0</td>
</tr>
<tr>
<td>Poplar Creek</td>
<td>Count</td>
<td>10</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>11.8</td>
<td>6.2</td>
<td>18.0</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>32</td>
<td>17</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>32.0</td>
<td>17.0</td>
<td>49.0</td>
</tr>
</tbody>
</table>
### Chi-Square Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>2.515</td>
<td>2</td>
<td>.284</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>2.710</td>
<td>2</td>
<td>.258</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>2.268</td>
<td>1</td>
<td>.132</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.16.

### Consensus (2 Levels) versus Inclusiveness: Chi-Square Test

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>1.160</td>
<td>1</td>
<td>.282</td>
<td>1.156</td>
<td>.331</td>
</tr>
<tr>
<td>Continuity Correctionb</td>
<td>.552</td>
<td>1</td>
<td>.458</td>
<td></td>
<td>.228</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>1.156</td>
<td>1</td>
<td>.282</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.331</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>1.136</td>
<td>1</td>
<td>.287</td>
<td></td>
<td>.228</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.39.
b. Computed only for a 2x2 table
APPENDIX E

HISTOGRAMS OF DATA DISTRIBUTIONS

Legitimacy Index Test 1: Data Distribution for Legitimacy Index Values Grouped into Survey Weighted Values and Literature Review Weighted Values
Legitimacy Index Test 3: Data Distribution of LI Values Using Survey Weights Grouped into the Three Watersheds
Legitimacy Index Test 4: Data Distribution of LI Values Using Literature Review Weights Grouped into the Three Watersheds
Scale Test 1: Data Distribution of Legitimacy Index Values Using Survey Weights Grouped into Three Different Scales
Scale Test 2: Data Distribution of Legitimacy Index Values Using Survey Weights Grouped into Two Different Scales
Scale Test 3: Data Distribution of Legitimacy Index Values Using Literature Review Weights Grouped into Three Different Scales
Histogram
One of Three Scales - Small, Medium and Large (1,2,3): 2.00

Mean = 58.52
Std. Dev. = 9.318
N = 14

Histogram
One of Three Scales - Small, Medium and Large (1,2,3): 3.00

Mean = 60.25
Std. Dev. = 8.317
N = 9
Scale Test 4: Data Distribution of Legitimacy Index Values Using Literature Review
Weights Grouped into Two Different Scales

Histogram
One of Two Scales - Large versus Small: Small Scale

Histogram
One of Two Scales - Large versus Small: Large Scale
Consensus Test 1: Data Distribution of Legitimacy Index Values Using Survey Weights
Grouped into 4 Levels of Consensus

Histogram

Five Levels of Consensus: 0.00

Mean = 58.93
Std. Dev. = 8.345
N = 27

Histogram

Five Levels of Consensus: 2.00

Mean = 50.65
Std. Dev. = 5.069
N = 6
Consensus Test 2: Data Distribution of Legitimacy Index Values Using Literature Review
Weights Grouped into 4 Levels of Consensus

Histogram
Five Levels of Consensus: .00

Histogram
Five Levels of Consensus: 2.00

Mean = 59.81
Std. Dev. = 9.755
N = 27

Mean = 52.33
Std. Dev. = 7.099
N = 8
Histogram
Five Levels of Consensus: 3.00

Mean = 58.00
Std. Dev. = 8.556
N = 11

Histogram
Five Levels of Consensus: 4.00

Mean = 52.05
Std. Dev. = 8.456
N = 5
Consensus Test 3: Data Distribution of Legitimacy Index Values Using Survey Weights
Grouped into 2 Levels of Consensus

Histogram
One of Two Scales - Large versus Small: Small Scale

Histogram
One of Two Scales - Large versus Small: Large Scale
Consensus Test 4: Data Distribution of Legitimacy Index Values Using Literature Review
Weights Grouped into 2 Levels of Consensus

Histogram
One of Two Scales - Large versus Small: Small Scale

Mean = 58.40
Std. Dev. = 9.104
N = 26

Histogram
One of Two Scales - Large versus Small: Large Scale

Mean = 59.08
Std. Dev. = 8.797
N = 23
Consensus Test 12: Data Distribution of Inclusiveness Rankings Grouped into 2 Levels of Consensus

**Histogram**

One of Two Scales - Large versus Small: Small Scale

Mean = 5.40  
Std. Dev. = 1.272  
N = 26

**Histogram**

One of Two Scales - Large versus Small: Large Scale

Mean = 5.39  
Std. Dev. = 1.406  
N = 23
1. Income (7 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test
Histogram
Income - Seven Levels: 5.00

Mean = 54.82
Std. Dev. = 6.939
N = 11

Histogram
Income - Seven Levels: 6.00

Mean = 59.87
Std. Dev. = 2.265
N = 7
2. Income (7 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test
5. Education (5 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test

**Histogram**

Education Five Levels: 1.00

- Mean = 60.03
- Std. Dev. = 15.347
- N = 4

**Histogram**

Education Five Levels: 2.00

- Mean = 56.20
- Std. Dev. = 7.74
- N = 17
6. **Education (5 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test**
Histogram

Education Five Levels: 4.00

Mean = 57.96
Std. Dev. = 5.567
N = 14

Histogram

Education Five Levels: 5.00

Mean = 57.96
Std. Dev. = 7.526
N = 6
7. Residence Type (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test
8. Residence Type (4 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test
Histogram

Residence Type: 3.00

Mean = 58.29
Std. Dev. = 8.503
N = 18

Histogram

Residence Type: 4.00

Mean = 54.34
Std. Dev. = 7.076
N = 8
9. **Stakeholder Group (4 Levels) versus Legitimacy Index (Survey Weights): Kruskal-Wallis Test**

**Histogram**

**Stakeholder 4 Groups: 1.00**

- Mean = 58.54
- Std. Dev. = 7.005
- N = 14

**Histogram**

**Stakeholder 4 Groups: 2.00**

- Mean = 55.85
- Std. Dev. = 7.968
- N = 25
10. **Stakeholder Group (4 Levels) versus Legitimacy Index (Literature Review Weights): Kruskal-Wallis Test**

**Histogram**

Stakeholder Group: 1.00

- Mean = 57.91
- Std. Dev. = 7.963
- N = 14

**Histogram**

Stakeholder Group: 2.00

- Mean = 58.16
- Std. Dev. = 8.805
- N = 25
11. **Group Participant Status (2 Levels) versus Legitimacy Index (Survey Weights): Mann-Whitney U Test**

### Histogram

**Active Watershed Group Participant: 1.00**

- Mean: 54.29
- Std. Dev.: 9.105
- N: 16

**Active Watershed Group Participant: 2.00**

- Mean: 58.98
- Std. Dev.: 6.336
- N: 32
12. Group Participant Status (2 Levels) versus Legitimacy Index (Literature Review Weights): Mann-Whitney U Test

![Histogram 1](image1)

- Mean = 54.59
- Std. Dev. = 10.012
- N = 16

![Histogram 2](image2)

- Mean = 60.36
- Std. Dev. = 7.481
- N = 32
APPENDIX F

CHARTS FOR QUESTIONS ON ELEMENTS OF LEGITIMACY

Inclusiveness of Their Watershed Groups - All Respondents (53 Total)

Select the degree to which you agree with or disagree with the following statement.

"The deliberation process in my watershed group is inclusive of all stakeholders."

Inclusiveness of Their Watershed Groups – Consensus Respondents (22 Respondents Total)

Select the degree to which you agree with or disagree with the following statement. "The deliberation process in my watershed group is inclusive of all stakeholders."
Inclusiveness of Their Watershed Groups – Non-Consensus Respondents (28 Respondents Total)

Select the degree to which you agree with or disagree with the following statement. "The deliberation process in my watershed group is inclusive of all stakeholders."

Few Elected Officials Participate: All Respondents (53 Respondents)

Select the degree to which you agree or disagree with the following statement. "Few elected officials participate in my watershed organization, which hinders the legitimacy of our efforts."
Few Elected Officials Participate: Poplar Creek (19 Respondents)

Select the degree to which you agree or disagree with the following statement: "Few elected officials participate in my watershed organization, which hinders the legitimacy of our efforts."

Few Elected Officials Participate: SE Fox (13 Respondents)

Select the degree to which you agree or disagree with the following statement: "Few elected officials participate in my watershed organization, which hinders the legitimacy of our efforts."

558
Few Elected Officials Participate: Rock River – 21 Respondents

Select the degree to which you agree or disagree with the following statement: “Few elected officials participate in my watershed organization, which hinders the legitimacy of our efforts.”

Inclusiveness as a Threat to Property Rights (53 Respondents)

Select the degree to which you agree or disagree with the following statement: “Few elected officials participate in my watershed organization, which hinders the legitimacy of our efforts.”
Quality Representation (53 Respondents)

Select the degree to which you agree or disagree with the following statement.

"The representatives in my watershed group effectively represents the interests of their constituents."

Demographic Diversity of Stakeholders (53 Respondents)

Select the degree to which you agree or disagree with the following statement. "The stakeholders in my watershed organization represent demographically diverse groups."
Income Levels of Watershed Group Participants (31 Respondents)

Select your annual income range.

Education Levels of Watershed Group Participants (35 Respondents)

Select your education level.
Residence Types: Urban versus Rural (35 Respondents)

Select your residence type.

Transparency of Watershed Partnership Activities (52 Respondents)

Select the degree to which you agree or disagree with the following statement.

"The partnership activities in my watershed are open and transparent to the point whereby all citizens are able to find out what is occurring within the watershed."
Those with Greater Resources have Greater Participation (52 Respondents)

“Those with greater resources (money, time, power, influence) participate in my watershed group to a larger extent than those with fewer resources.”

Trust Level in the Watershed (50 Respondents)

“There is a high level of trust between different stakeholders in my watershed.”
Trust Level in the Rock River Watershed (20 Respondents)

Select the degree to which you agree or disagree with following statement: "The level of trust between different stakeholders has improved since the inception of my watershed group."

Trust Level in the SE Fox Watershed (13 Respondents)

Select the degree to which you agree or disagree with following statement: "There is a high level of trust between different stakeholders in my watershed."
Trust Level in the Poplar Creek Watershed (18 Respondents)

Select the degree to which you agree or disagree with the following statement: "There is a high level of trust between different stakeholders in my watershed."

![Bar chart showing trust levels in the Poplar Creek Watershed.]

Trust Levels Increase Over Time (49 Respondents)

Select the degree to which you agree or disagree with the following statement: "The level of trust between different stakeholders has improved since the inception of my watershed group."

![Bar chart showing trust levels over time.]

566
Accountability Measures Exist (49 Respondents)

Select the degree to which you agree or disagree with the following statement: “Stakeholders who do not comply with the watershed organization’s plans and/or recommendations are generally held accountable by some governmental entity for their action or inaction in my watershed.”

Self-Selection of Watershed Decision-Making Model: Consensus, Democratic, or Hierarchical

Choose the statement below that best describes your watershed group
Rating the Need for Consensus (22 Respondents in Consensus-Based Watersheds Only)

Exclusion of Certain Stakeholders: (22 Respondents in Consensus-Based Watersheds Only)
Self Exclusion of Stakeholders (22 Respondents in Consensus-Based Watersheds Only)

Select the degree to which you agree with following question: “The consensus model of decision-making used within our watershed group often leads to the self-exclusion of certain stakeholders because they become impatient with the time-consuming nature of the process.”

Avoidance of Contentious Issues in Consensus-Based Groups (22 Consensus Respondents Only)

Select the degree to which you agree or disagree with the following statement: “The consensus model of decision-making used within our watershed often results in the avoidance of contentious or controversial issues.”
Considering Impacts Outside the Watershed, Including Downstream: All Respondents (55 Total)

Local Environmental Issues are Important: All Respondents (55 Total)
National Environmental Issues are Important: All Respondents (55 Total)

Are Your Top Three Issues Being Addressed: Consensus Respondents Only (22 Total)
Are Your Top Three Issues Being Addressed: Non-Consensus Respondents Only (27 Total)

![Bar chart showing the percentage of respondents who think their top three issues are being addressed by the watershed organization. The majority of respondents (18) are in agreement, while 9 are not.]

Public Participation (51 Respondents)

Select the degree to which you agree or disagree with the following statement: "Watershed partnership activities in my watershed are open to all residents who have a desire to become involved, including the public."

![Bar chart showing the level of agreement among respondents. The majority (26) strongly agree, while 10 slightly agree, 5 neither agree nor disagree, and 10 strongly disagree.]
Just and Equitable Outcomes (51 Respondents)

Select the degree to which you agree or disagree with the following statement: "The outcomes (recommendations and/or plans) resulting from watershed partnership deliberations are just and equitable for all interests in my watershed."

Plans Increase the Well-Being of Residents (51 Respondents)

Select the degree to which you agree or disagree with the following statement: "The plans and/or recommendations implemented as a result of watershed group deliberations increase the well-being of residents in the area."
Residents not Represented Receive Benefits (51 Respondents)

Outcomes are Fair for Resource Owners and Users (51 Respondents)
Access to Information (52 Respondents)

Select the degree to which you agree or disagree with the following statement. "Because all stakeholders, including the public, have access to information regarding group activities, the understanding of watershed processes and problems is enhanced."

Effective Information Exchange (50 Respondents)

Select the degree to which you agree or disagree with the following statement. "Information exchange between stakeholders and scientists in my watershed is effective in enhancing understanding of watershed processes and problems."
Effective Public Outreach Campaign (42 Respondents)

Open and Transparent Watershed Partnership Activities (50 Respondents)
Local Knowledge Prevails (52 Respondents)

Select the degree to which you agree or disagree with the following statement: "Local preferences and knowledge should ultimately prevail, even when they conflict with the judgement of scientific experts (Weible, Sabatier, and Lubell 2004)."

Scientific Methods are Best (50 Respondents)

Select the degree to which you agree or disagree with the following statement: "Scientific methods provide the best technique for understanding physical and socio-political issues in the watershed (Weible, Sabatier, and Lubell 2004)."
Scientific Experts are Biased (50 Respondents)

Select the degree to which you agree or disagree with the following statement: "Scientific experts often look for data, which supports their own personal values (Weible, Sabatier, and Lubbell 2004)."

Stakeholders Should Determine Issues in the Beginning (50 Respondents)

Select the degree to which you agree or disagree with the following statement: "I believe that watershed organizations should rely on stakeholder involvement in the beginning to determine which scientific issues should be addressed (Weible, Sabatier, and Lubbell 2004)."
Plans Should Be Suggestions Only (49 Respondents)

Select the degree to which you agree or disagree with the following statement: "Regardless of the process, resulting plans should only be suggestions (advisory) for users of natural resources."

Plans Should Be Mandatory (49 Respondents)

Select the degree to which you agree or disagree with the following statement: "Regardless of the process, resulting plans should be mandatory for users of natural resources."
Government has an Obligation to Protect Natural Resources (49 Respondents)

Government Policies Enhance Well-Being (49 Respondents)
Farmers Receiving Assistance Should Implement Plans to Protect Resources (49 Respondents)
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Dissertation Title:
The Legitimacy of Selected Watershed Organizations in the Midwest

Major Professor: Steven E. Kraft

Publications: