EXPLORATION OF ANTECEDENTS OF ENVIRONMENTALLY RESPONSIBLE BEHAVIOR BY STAKEHOLDERS IN GRAND LAKE WATERSHED

By

TERI S. HOLMES

Bachelor of Arts Communication
University of Tulsa
Tulsa, Oklahoma
1997

Master of Science Environmental Management
Oklahoma State University--Tulsa
Tulsa, Oklahoma
2007

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Dissertation Approved:

Dr. Lowell Caneday

Dissertation Adviser

Dr. Kevin Gustavson

Dr. Yoonjung Cho

Dr. Ken Ede

Outside Committee Member

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ABSTRACT: Grand Lake O' the Cherokees in Oklahoma is one of two lakes in the State of Oklahoma that allows private ownership and development of the shoreline. This has created water quality issues attributed to phosphorus levels in effluent waste water from septic systems and municipal water treatment facilities, as well as nutrient and sediment contamination from nonpoint source runoff**.** In the Grand Lake Watershed Basin, there are currently twenty segments listed on the Missouri 303(d) Clean Water Act (CWA) list as impaired for nutrients and eighty segments listed on the Kansas 303(d) Clean Water Act (CWA) list as impaired by organic enrichment and eutrophication The purpose of this study was to evaluate Grand Lake Watershed Basin stakeholder perceptions of the Grand Lake water quality issues to gain an understanding of the phenomenon and facilitate more effective education outreach programs and policy development.

Utilizing Q-Method, 19 participants provided ranked order sorting arrays for 36 statements encompassing six behavioral antecedents for environmentally responsible behavior. The six behavioral antecedents, based on previous research on environmentally responsible behavior, included ascription of responsibility, knowledge and awareness, locus of control, sense of place, place protection, and motivation. Four perspectives emerged from the study data demonstrating that different levels and combinations of behavioral antecedents affect how people construct their understanding of an environmental problem creating perspectives that function to define both the individual's idea of the problem and their role in the problem resolution.

Factor 1 provided insight into previous models on environmentally responsible behavior linking high levels of ascription of responsibility, locus of control and knowledge to intention to act on an environmentally responsible behavior while Factor 2 contributed to the understanding of strong sense of place and place protection elements in environmentally responsible behavior. Factor 3 and factor 4 were limited by the small sample size, but each provided enlightenment on perspectives derived from low levels of knowledge or internal locus of control for the issue, in combination with the other antecedents. These findings support the need for greater discernment of human perspectives associated with environmental issues in order to affect improvement through behavior change.

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CHAPTER I

INTRODUCTION

Since the last part of the 20th century, significant empirical research in environmental sociology and environmental psychology (e.g. Dunlap & Jones, 2002; Buttel & Flinn, 1978; Freudenburg, 1991; Heberlein, 1981; Jones, Fly, & Cordell,1999; Tognacci, Weigel, Wideen & Vernon. 1972; Tremblay & Dunlap, 1978; Van Liere & Dunlap,1980, 1981) has only determined that the majority of individuals will profess to possessing some measure of environmental concern, but not within a consistent framework of indicators (e.g. sociodemographic variables, place of residence, socialization, exposure to environmental degradation) and that expressed concern does not necessarily translate to environmentally responsible behaviors (DeYoung, 1990; Kaplan, 2000; Schultz & Zelezny, 2003; Stern, Dietz & Black, 1986) A number of issues with measurement and operationalization of environmental concern has only served to further obscure any meaningful results arising from research on environmental concern as it relates to behavior (Dunlap & Jones, 2002;Van Liere & Dunlap, 1981). However, with a rapidly expanding world population and finite resources available for our survival (Homer-Dixon, 2001; Pearce, 2007) it becomes imperative to understand motivational drivers between personal and social norms of environmental concern and actual behavior. Sustainable societies require behavioral practices that decrease dependence on finite resources and alleviate unnecessary and wasteful use of ecosystem processes and products, while providing a desirable standard of living for all members of the community (UNCED, 1992). In this study, environmental concern references" the degree to which people are aware of problems regarding the environment and support efforts to solve

them and/or indicate a willingness to contribute personally to their solution" (Dunlap & Jones, 2002, p. 485). One of the few promising observations arising from previous research is in regard to issue salience which may be the critical impetus for motivation to engage in environmentally responsible behavior. Environmental issues that are locally experienced and affect or pose a threat to individuals' day-to-day lifestyle and existence typically result in higher expressions of environmental concern because of issue salience (Bosso & Gruber, 2006; Freudenburg, 1991; Heberlein, 1981; Klineberg, McKeever & Rothenbach, 1998 Lowe & Pinhey, 1982; Tremblay and Dunlap, 1978). Most people have a difficult time cognitively constructing concern for objects that contextually are ambiguous and abstract (e.g. climate change on a global level), but they may have more ability to assess new information when the object or issue is tangible, relevant, and experienced, particularly when dealing with the environment (Klineberg, et al., 1998). For the purpose of this study, environment will be defined as "the sum of all the external conditions affecting the life, development and survival of an organism" (USEPA, n.d.).

People construct their own truth or understanding of an environmental problem by connecting prior or current personal experience and knowledge with new information, generating a magnitude of emotion associated with this knowledge creation (Freudenburg, 1991; Lowe and Pinhey, 1982; Michael, 2006; Tremblay and Dunlap, 1978; Schunk, 2008). As such, researchers are increasingly focusing on an examination of humanist geography and elements of place attachment, place dependence and place identity in order to frame environmental issues as attitude objects that are tangible, experiential-based, and have been assigned meaning on a subjective, but essential level (Uzzell, Pol and Badenas, 2002, Stedman, 2002 and 2006, and Vorkin, and Riese, 2001). As Relph (1976) argued in his seminal publication "Place and Placelessness" that by understanding the significance of a place through assigned meaning to a space by individuals and societies, one might find a way to manage, preserve and repair our environment.

Human nature has a strong propensity to protect and retain those elements of a physical landscape that one deems, albeit subjectively, necessary for one's survival and comfort (Tuan, 1974) and research has demonstrated that individuals with strong positive attitudes toward an attitude object will engage in behavior that supports or enhances the attitude object (Manzo, 2005; Schultz, 2000; Stedman 2002; Vaske & Korbin, 2001). The people-place connection may be a situational variable that explains the contradiction between reported environmental concern and actual proenvironmental behavior (Manzo, 2005). However, it is important to note that the person-place relationship is complex, although it appears to be an independent variable on environmental concern and proenvironmental behavior (Kaltenborn, 1998). Unfortunately, there is still the issue of defining exactly what constitutes environmentally responsible (or proenvironmental) behavior. For the purpose of this study, environmentally responsible behavior (also referred to as pro-environmental behavior) will be defined as both the extent to which a behavior changes resource availability or alters the environment (in a positive manner), as well as behavior undertaken with an intent to affect a beneficial impact (Stern, 2000). Since internalized social norms provide ethical foundations that serve as an internal guide for cooperative living and self-preservation in human society, and provide the motivational basis for human behavior, the above definition of environmentally responsible behavior allows for latitude in addressing both an impact-oriented and intent-oriented approach to motivate environmentally responsible behavior. Specifically, it provides for skill component education necessary to perform a behavior, as well as encouraging internalization and integration of motivational norms supportive of pro-environmental behavior through cognitive learning (Gibbs, 1991; Sterns, 2000; Thøgerson, 2006, 2009).

An immense amount of research (e.g. Schwartz, 1977; Stern, Dietz, Abel, Guagnano and Kalof, 1999; Heberlein, 1972; Hines, Hungerford & Tomera, 1987) has noted that awareness of consequences (issue knowledge and risk perception), ascription of responsibility motivated by

guilt or obligation, and locus of control which speaks to one's perception of self-efficacy (Bandura, 1982) are cognitive elements that have demonstrated a correlation with motivation toward environmentally responsible behavior. Despite this correlation, there are a myriad of interactions between personality characteristics and these cognitive elements within contextual and situational frameworks that create infinite possibilities regarding human behavior, thus significantly impeding any certainty of predictive ability by these criteria in a direct linear causal relationship with intention to act (Hines, Hungerford, & Tomera, 1987; Bamberg & Moser, 2007). Due to the cognitive complexity of human behavior, research seeking to explain and/or predict environmental behavior related to the human-environment relationship must first endeavor to understand the subject actor (Buttimer, 1976; Fishwick & Vining, 1992; Hutson & Montgomery, 2010; Ley, 1976; Manzo 2005; Seamon, 1982; Shamai, 1991).

There is great difficulty in definitively quantifying human cognition, affect and ultimately behavior in the human-environment relationship from a traditional positivist research approach. Positivism asserts that "genuine knowledge must be perceptible in time and space and thus is founded on empirical reality and validity" and is represented by objectivity, quantification, explanation, prediction, control, replication and public verifiability (Seamon, 1982, p. 120). As Buttimer (1976) reminds us, positivist approaches "record facets of experience as emanating from a past, but shed little light on direction or meaning" (p. 278). As such, there is growing support for employing phenomenological research methodologies to the human-environment relationship or as Seamon (1982) expressed so eloquently "the need is a return to the foundations of meanings, things, and experiences, and to describe those foundations accurately and clearly" because all group and individual behavior and decision-making derives from the latent foundations of subjective meaning (p. 119; See also Ley, 1976). A phenomenological approach to environmentally responsible behavior research offers the possibility of illuminating interactions

and relationships between known cognitive and affective elements that affect initiation of environmentally responsibility behavior.

Issue Background

Created by the junction of the Neosho and Spring Rivers at a location 10 miles southeast of Miami, Oklahoma, the Grand (Neosho) River is wholly located within the State of Oklahoma. The Grand (Neosho) River has a fairly constant flow due to its many spring-fed tributaries from the eastern tributaries; with a 2-foot drop every mile, the hydrology was well adapted to development of water storage reservoirs and hydroelectric plants.

In 1935, the Oklahoma Legislature created the Grand River Dam Authority (GRDA) expressly to administer the use of the Grand (Neosho) River for both hydroelectric power development and flood-control (Holway, 1948). The New York Times, in 1939, reported on the construction of the Pensacola Dam and the creation of Grand Lake O' the Cherokees referring to it as one of Oklahoma's "play spots" providing enjoyment for numbers of sportsmen while creating sanctuaries for migratory water fowl (Ross, 1939).

Grand Lake covers 46,500 acres; however, its watershed encompasses portions of four states (Arkansas, Kansas, Oklahoma and Missouri), two United States Environmental Protection Agency regions, tribal entities and local governments lending complexity to the pollution abatement problem that exists on the lake (State of Oklahoma, 2004). Within the State of Oklahoma, Grand Lake is governed by a multitude of state regulatory entities including the Grand River Dam Authority which has the power to "control, store, preserve, distribute and sell the water of the Grand River" as well as develop, generate, buy, sell and distribute hydroelectric power derived from the Pensacola Dam operations, the Oklahoma Conservation Commission which is the State of Oklahoma's lead on Clean Water Act's 319 program, the Oklahoma Oil and Gas Commission which has regulation over exploration, production and transportation of oil and

gas on the watershed, Oklahoma Department of Agriculture, Food and Forestry which primarily regulates concentrated animal feeding operations on the watershed lands, Oklahoma Department of Environmental Quality which oversees the point source discharge permitting program (NPDES) and public water supply quality, Oklahoma Department of Wildlife Conservation which regulates activities associated with fishing and other wildlife activities in the watershed (OWRB, 1995; State of Oklahoma, 2004). Finally, as a part of the nation's comprehensive flood control plan enacted by the Flood Control Act of 1936, the United States Corp of Engineers has responsibility for managing the flood control pool of Grand Lake (USACE n.d.). Designated uses of Grand Lake include public and private water supply for a number of communities surrounding the lake area, warm water aquatic community, agriculture, municipal and industrial uses, hydroelectric power generation, flood control, primary body contact recreation, and aesthetics (OWRB, 2007).

Grand Lake, the terminal water body in the Grand Lake watershed, is currently impaired primarily through the effects of low dissolved oxygen and turbidity from elevated nutrient discharges from the lake's watershed area, and sediment inputs from stormwater runoff that provides additional mobility for the nutrient movement, especially nitrogen and phosphorous (GLWAF, 2008). In the Grand Lake Watershed Basin, there are currently twenty segments listed on the Missouri 303(d) list as impaired for nutrients and eighty segments in Kansas listed as impaired by organic enrichment and eutrophication (State of Oklahoma, 2004). In 1995, the Oklahoma Conservation Commission and Oklahoma State University completed the Grand Lake Basin Management Plan which estimated that total phosphorus loadings to the Grand Lake Watershed Basin were 2,490,000 kg/year and 72% of that originated from non-point source discharges (State of Oklahoma, 2004).

Nutrient loading (nitrogen and/or phosphorus) in water resources is a primary stimulus for algal blooms although climate change is expected to be a contributing factor to increasing

algal blooms as higher average temperatures will affect precipitation and evaporation leading to changes in lake levels; lake warming could affect the thermal structure of freshwater lakes reducing mixing changing lake chemistry (Beeton, 2002).

Land use in the watershed is primarily planted pasture (36%) or natural grassland (grazing) (21%), cropland (20%) and forest (14%) representative of significant agricultural usage (GLWAF). Most of the agricultural usage is a low-intensity type of activity (e.g. grain or hay production and range cattle) but since the mid-1990's poultry operations have changed their production methods to intensive animal rearing and production resulting in thousands of broilers within a few hundred cubic feet in poultry houses particularly in the Elk River watershed located in Missouri and as of 2004, there were 65 registered poultry operations in the Oklahoma portion of the Grand River Watershed housing approximately 22 million broilers (OWRB, 1995; OWRB, 2005, State of Oklahoma, 2004).

These types of intense animal production facilities generate substantial amounts of manure or poultry litter which ranchers and farmers have utilized as a fertilizer on their grazing lands which creates a potential for nutrient enriched non-point source runoff in watershed areas (OWRB, 1995). This activity creates a potential source for high-level, nutrient-enriched non-point source water runoff in the watershed area. The typical frequency and concentration of land-application of litter exceeds the soil's assimilation capacity leaving a significant amount of nitrogen and phosphorus available for non-point source runoff contamination (OWRB, 1995; OWRB, 2007).

Point source pollution from municipal water treatment facilities and industrial facilities also contributes nutrients to Grand Lake. Since 2002, there has been a significant increase in minor source dischargers in Missouri (261 additional dischargers), while Oklahoma, Arkansas and Kansas had negligible changes in point source dischargers in the watershed area. Permit

limits for phosphorus and nitrogen discharge were only available for two major dischargers. One of those dischargers, the City of Bentonville in Arkansas, exceeded their limit for total phosphorus on an 8 year average (1987-2005) (OWRB, 2007). No other dischargers' data had discharge limits (OWRB, 2007). Of the eight major dischargers in Kansas, including Tyson Fresh Meats, Inc. in Emporia, Kansas, three of the major point source dischargers had no total phosphorus data available and the other five only had partial data for the period of 1987-2005 (OWRB, 2007).

Reports from the Oklahoma Secretary of Environment document the upward trending of nutrient concentration in the water which imperils the future water quality of Grand Lake and impacts current designated water uses (OCC, 2004). One avenue towards addressing this issue is to work with citizen-based stakeholder groups to address water quality issues through the development and implementation of watershed improvement plans. However, to date, despite the popularity of the lake among recreationists and significant economic dependence on tourism generated by the lake, along with a multitude of agricultural, municipal and industrial stakeholders dependent on quality water in the watershed, there are too few citizen-based stakeholder groups which is impeding the development and implementation of watershed improvement plans (GLWAF, 2008) As planning efforts take time and there will be lag time in water quality improvements in receiving bodies of water, material improvements to the watershed water quality do not look promising for the next ten year. As such, there is a need to understand stakeholder perceptions of the situation in order to ascertain impediments toward motivation for citizen-based stakeholder participation in watershed improvement plans.

Purpose of the Study

The purpose of this study is to describe the perceptions of Grand Lake watershed stakeholders toward the water quality issue and their role and responsibility toward watershed

improvement which will provide understanding to the obstacles and interruption between expected activation of personal antecedents of motivation to act or behave in a desired manner. Because this type of research seeks the "natural attitude" in the taken-for-granted everyday life (Seamon, 1982, p.123), Q methodology was chosen as the research method. This research method will provide a discernible measurement of everyday discourse on the issues surrounding the water quality at Grand Lake, thus allowing for an understanding of the cognitive and affective processes operating as antecedents of current behavior. Understanding current perceptions as the latent operant condition of behavior will provide insight and inroads to developing educational programs and technical assistance campaigns for the watershed improvement program. Ultimately, understanding the life-world experience of the Grand Lake stakeholder will enable successful outreach efforts for citizen-based stakeholder input.

Research Questions

This study will address the following research questions?

1. What attitudes and perceptions are taken for granted regarding the Grand Lake water quality issues and efforts to improve the watershed?

2. What do the patterns of discourse reveal about motivation to participate in the desired behaviors for watershed improvement?

Definition of Terms

Anthropocentrism: A philosophical view of the human-environment relationship wherein the environment or nature deserves moral consideration in the relationship only because how nature is treated affects humans; it is a utilitarian, human-centric viewpoint wherein mankind assumes all privileges of the human-environment relationship, but no reciprocal obligation toward the environment (Gough, Scott and Stables, 2000; Leopold, 1949).

Ascription of responsibility: belief of one's ability or obligation to take actions to avert the consequences of threatening or hazardous environmental conditions (Stern, Dietz, Abel, Guagnano, & Kalof, 1999).

Awareness of consequences: the belief or knowledge that environmental conditions pose a threat or a hazard to self, others or non-human organisms in the ecosystem (Stern, Dietz, Abel, Guagnano, & Kalof, 1999).

Attitude: An intrapersonal subjective positive or negative evaluation assessed towards an object or action.

Concourse: The "communicability surrounding any topic" or the multitude of perceptions and viewpoints arising from an issue or subject (Brown, 1993).

Condition of instruction: A statement that elicits agreement or disagreement with the operationalized theoretical constructs (McKeown & Thomas, 1988).

Dominant Social Paradigm: A cultural belief in sustainable industrial growth and economic prosperity while relying on technological solutions to detrimental impacts to the natural environment.

Ecocentrism: A philosophical viewpoint wherein the human-environment relationship is one of reciprocity and interdependence (Carson, 1962; Gough, Scott, & Stables, 2000; Leopold, 1949)

Environment: "The sum of all the external conditions affecting the life, development and survival of an organism (USEPA, n.d.).

Environmental concern: "The degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution" (Dunlap & Jones, 2002, p. 485).

Environmentally responsible behavior: Can be defined on an impact basis (i.e. the extent to which a behavior changes resource availability or alters the environment), as well as an intent-orientation defined as behavior undertaken by an actor with an intent to affect a beneficial impact (Stern, 2000).

Factors: Families or groupings of interrelated or correlated responses (Brown, 1993).

Factor analysis: The statistical means, by mathematical analysis, of grouping subjects or responses (McKeown & Thomas, 1988).

Factor loading: The correlation coefficient of a Q-sort or correlations between variable and factor (McKeown & Thomas, 1988).

Knowledge: understanding the nature of the issue and its ecological and human implications (Hines, Hungerford, & Tomera, 1986; Hungerford & Volk, 1990).

Locus of Control: an individual's belief in their ability to bring about change by their own behavior. When an individual has a positive belief in their ability to affect change in a condition by their own behavior, they have an internal locus of control. If the individual does not possess a belief in their ability to affect change in a condition through their own behavior, or attribute the requisite change to powerful others or entities, they are said to possess an external locus of control (Hines, Hungerford & Tomera, 1987; Rotter, 1966).

Moral Norm: See Personal Norm

New Environmental Paradigm: A belief in the interdependence of humans and the natural environment; that there are limits to human population and economic growth. The natural systems, of which humans are a part of, are interdependent and must exist in balance in order to remain viable. Sustainable growth is an oxymoron under this perspective (Dunlap &Van Liere, 1978).

Personal Norm: Often referred as a moral norm, a personal norm refers to the intrapersonal "normative beliefs and the motivation to comply with these beliefs" that an individual possesses (Kaiser & Scheuthle, 2003, p. 1034.)

Place: A subjective system of meanings and symbols that evoke cognitive and affective responses with a setting or physical location that work to define our day-to-day life-world experience (Low & Altman, 1992; Relph, 1974).

Place attachment: An assessed level of importance of a setting or a location that provides security and a sense of connection or relatedness to the geography or a "rootedness" to one's existence (Relph, 1976).

Place dependence: The ability of a setting to meet the goal expectations of the person or people who experience it (Patterson, Roggenbuck and Watson, 1992)

Place identity: Related to defining who, where, and what the person is, as well as how he or she will behave in relation to the connection or association with the place (Prohansky, 1978).

Phenomenology: The study of phenomena; the exploration of meanings which humans attribute to the every-day items and experiences of their life (Buttimer, 1976; Ley, 1977; Seamon, 1982).

P-set: Purposively selected group for participation in a Q-study.

Q-Methodology: Utilizes a "distinctive set of psychometric and operational principles" that when coupled with statistical applications, allows for a systematic means of revealing and examining human subjectivity (McKeown & Thomas, 1988, p.7.).

Q-set: Statements derived from a developed concourse on a given subject that participants will rank order in a Q-sort (McKeown & Thomas, 1988).

Q-sort: A technique utilized in Q-Methodology to assess a participant's perception of an issue or subject by the rank ordering of their own responses on a factor array chart for factor analysis (Brown, 1993).

Sense of place: The whole of the beliefs, values, perceptions, meanings, and experiences that are associated with a setting or location that create daily feelings of security and control in our lives, provide stimulation and succor through social aspects in the place, allow linkages between past and present, values and beliefs, community and nation (Low & Altman, 1992).

Significant loading: A correlational loading on a factor that is statistically determined as not due to chance.

Social Norm: An informal norm that functions to regulate social behavior that a sufficient number of individuals in a population share and acknowledge to apply to certain situations. A social norm implies that "people should perform a proscribed behaviour or not perform a proscribed behaviour" (Thøgersen, 2008, p. 459).

Subjectivity: "A person's communication of his or her point of view" (McKeown & Thomas, 1988, p. 12).

Assumptions

Assumptions in this study include:

1. Q-methodology was determined to be the most appropriate phenomenological research tool to systematically examine subjectivity regarding decisions toward environmentally responsible behavior toward watershed improvement.

2. The Q-set for this study, developed from a hybrid concourse of actual and theoretical perspectives, will be appropriate and representative of the full concourse available.

3. Participants in the study will feel fully secure in the anonymity of the study to respond in an honest and reliable manner.

Limitations

1. The perspectives discerned from this research method do not reflect the infinitely possible viewpoints that individuals may have toward the attitude-object and issue under the study.

2. The results from Q-method-based studies are not generalizable inductively; the views are specific to the phenomena being researched, and not to the larger general public.

CHAPTER II

LITERATURE REVIEW

This chapter summarizes the theoretical and research literature that supports this study. The purpose of the study is to investigate perceptions of water quality on the Grand Lake O' the Cherokees and assess antecedents of environmentally responsible behavior indicative of intention to act in a common resource dilemma. To accomplish this purpose, the research examined values and perceptions of recreational lake property owners who have demonstrated commitment to the area by their historic use of the lake.

The literature review describes the multiple and interrelated facets of the research focus. This chapter is divided into four sections: section one reviews research attributed to expression, definition and measurement of environmental concern, section two explores the development of place theory and association with environmentally responsible behavior (ERB), and section three describes the theoretical models of environmentally responsible behavior, including the Hines, et al, model which this study utilizes as a guide for investigating the manifestation of antecedent interaction as an expression of an everyday discourse and taken for granted behavior and attitudes and finally, section four explains phenomenology as a research philosophy.

Environmental Concern

Research has noted generally that attitudes, values and beliefs, and the principles that descend from them, determine the behavioral practices and lifestyle norms which society builds

upon (e.g. Dunlap & Van Liere, 1978; Heberlein, 1981). Sustainable societies will require behavioral practices that decrease dependence on finite resources and alleviate unnecessary and wasteful use of ecosystem processes and products, while providing a desirable standard of living for all members of the community. Achieving this paradigmatic cultural shift requires an examination of perceptual differences as to the purpose and value of the environment, as well as mankind's relationship to it based on a number of independent variables (Leopold, 1948; Carson, 1962).

Unfortunately, three decades of significant empirical investigation regarding determinants of environmentally responsible behavior has only revealed that professed environmental concern is a poor predictor of action (Dunlap & Van Liere, 1978; Dunlap & Jones, 2002; Buttel, and Flinn, 1978; Tognacci, et al. 1972; Heberlein, 1981; Gruber, 2003) and consideration of socio-demographic determinants (e.g. age, gender, socio-economic position, political proclivity) has only produced only a few consistent generalities (Buttel & Flinn, 1978; Gruber, 2003; Tognacci, et al. 1972). As expressed by Jones, Fly, and Cordell (1999) demographic characteristics appear to provide "little insight into who possesses a pro-environmental ethic"(p 495).

As Dunlap and Jones (2002) note much of the inconsistency in the research findings has been attributed to difficulty in defining environment concern which is paramount to operationalizing it for measurement purposes. As Heberlein (1981) expressed, the issue lies in the "ambiguity of the object itself," (p. 242). The United States Environmental Protection Agency has defined environment as "the sum of all the external conditions affecting the life, development and survival of an organism", but the definition is still elusive in the realm of social conception (Dunlap & Jones, 2002). While society has constructed a default understanding of the environment as involving, and defined by, natural structures, objects, areas and systems such as trees, water, air, soil, wildlife, weather, population, and wilderness (substantive issues)

environment is rarely, if at all, specifically defined in academic studies beyond the use of the word "environment" which has allowed the concept to encompass a wide spectrum of physical realms from wilderness to one's immediate surroundings (Dunlap & Jones, 2002; Heberlein, 1981; Van Liere & Dunlap, 1981). As a matter of establishing a standard for research purposes, Dunlap and Jones (2002) suggest that the definition of environmental concern should refer "to the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution" (p. 485).

However, utilizing this definition requires establishing a substantive concept of the environment as relating to issues or problems (e.g. pollution, conservation, population) or biophysical facets (e.g. air, land, water) along spatial, temporal, utility and specificity continuums, providing a policy-relevant approach to expression of environmental concern (e.g. tradeoffs, ascription of responsibility) or constructing a theoretical approach related to affective, cognitive or conative dimensions of concern as related to the environment (Dunlap & Jones, 2002). As evident, there is significant potential for subjectivity and variability associated with both defining and interpreting environmental concern which has significant implications regarding reliability and accuracy of previous research exploring expressed levels of environmental concern (Dunlap & Jones, 2002; Van Liere & Dunlap, 1981).Thus, the only consensus derived from the bounty of research is that, in a very general sense, the majority of individuals in society report having some measure of environmental concern particularly in regard to environmental protection related to pollution reduction (Dunlap, 2002; Gruber, 2003).

Issue Salience

While defining either environment or concern is fraught with difficulty for the purpose of empirically investigating its existence and predictive determination of environmentally responsible behavior, Klineberg, McKeever and Rothenbach (1998) argue that the reason for

much of the inconsistency in studies of demographic variables and environmental concern lies in the way individuals cognitively construct concern for an ambiguous, yet ubiquitous structure such as the environment. Klineberg et al. (1998) advocate that environmental concern is usually measured in relation to other concerns, drawing on the context of at least two other attitudes: one's perception of the importance of environmental quality and the value one assigns to that importance in relation to other competing concerns, or in other words, the trade-offs required to achieve or maintain the desired level of environmental quality (Klineberg et al., 1998). Or as Schultz and Zelezny (2003) explain, in regard to environmental protection issues, most individuals want the government to do something, focusing on business and industry, and only in regard to those problems seen as posing risk to the individual. This process is similar to that of attention theories in the education discipline. Attention is a prerequisite for learning, but a number of theorist have identified antecedents and obstacles to activating attention including Broadbent's (1958) filter theory which proposes that information is preliminarily assessed for relevance and only those considered important or of interest are selected for further cognitive processing (Schunk, 2008).

As pointed out by Klineberg et al, (1998), "people differ importantly in the resources available to them and in the kinds of tradeoffs they are willing to accept," (p. 752); nevertheless, salience may be the critical aspect of determining one's level of expressed environmental concern which Bosso and Gruber (2006) support, asserting that low issue-salience may be one reason for low environmental concern as people worry about many things, "but not all issues generate an intensity of feeling strong enough to motivate action and consequence" (p.82). Interestingly, Klineberg et al.'s (1998) study noted that residence (as measured by size of town) "consistently predicts environmental concern only when it is phrased in terms of the perceived quality of the local environment" (p. 751), thus environmental issues presented at a local-level which are perceived to threaten or affect one's day to day living appear to result in higher expressions of

environmental concern because of their ability to create a magnitude of emotion (Freudenburg, 1991; Lowe & Pinhey, 1982; Tremblay & Dunlap, 1978). Still, there is no consensus as to the predictive ability of issue salience in the context of general or even specific environmental issues. As such, researchers have revisited the residence variable in relation to expression of environmental concern through environmentally responsible behavior by an examination of place theory constructs of attachment, dependence and identity since local issues appear to provide a higher likelihood of salience (Uzzell, Pol & Badenas, 2002, Stedman, 2002, 2006; Vorkinn & Riese, 2001).

Place Theory

Heberlein (1981) noted that "the environment is an experiential object" never experienced as a "whole, but rather separate distinct aspects" from which individuals develop unique and specific attitudes toward (p.243). Individuals assign meaning to the environment based on their experience (Cheng, Kruger & Daniels, 2003; Davenport & Anderson, 2005;Gustavo & Manor, 1998; Hay, 1988, 1998;Kruger,1996, 2006; Kyle, Bricker, Graefe & Wickham, 2004; Kyle, Graefe, Manning & Bacon, 2004; Low & Altman, 1992; Manzo, 2005; Prohansky, 1978; Relph, 1976; Shamai, 1991; Smale, 2006; Stedman, 2003; Twigger-Ross & Uzzell, 1996; Tuan, 1974; Vorkinn & Riese, 2001; Williams & Patterson, 1996; Williams, Patterson, Roggenbuck &Watson, 1992). Relph (1976) argued in his seminal publication "Place and Placelessness" that by understanding the significance of a place through assigned meaning to a space by individuals and societies, one might find a way to manage, preserve and repair our environment.

Originating in the humanistic geography domain, early studies of human attachment to geographic locations and spaces (e.g. Prohansky 1978; Relph, 1976; Tuan, 1974; Schreyer, Jacob, &White; 1981; Seamon, 1982;) have, among many other terms, referred to meaning and

significance in terms of place (Tuan 1974), space (Relph, 1976) and the geography of the human "life-world" (Seamon, 1982) . The concept of place is different than space; space is essentially the geometry of a physical location and has objectively defined boundaries and properties whereas place is subjective, defined by the lived human experience and socially and individually created meanings evoked by that physical location (Relph, 1976; Tuan, 1974; Smale, 2006). Kruger (1996) states we can think of place as a system of meanings and symbols that evoke commitments to a shared image by forming attachments through social interactions with the place and others in a way so that a particular "identity seems real" and people form and enact rituals to sustain this identity (Kruger, 2006, p. 389). A space does not become a place until it acquires a meaning (Smale, 2006).

Relph (1976) writes that creating and knowing significant places in the world defines our humanity as "a profound and complex aspect" of our daily living in this world and the definition of and identity with a place is the physical manifestation of our beliefs, both individually and collectively (p. 1). As Relph (1976) asserts, the physical and the phenomenological are inseparable; mankind names the geography, assigning meaning through description and identification, thus the process, while not objective, is significant, creating order from chaos in our physical world (Relph, 1976). As such, one can only begin to explicate place by examining it holistically in terms of location, terrain and/or landscape, time, and the human experience through cultural, historical and social activities (Relph, 1976).

Place Theory Constructs

Initial theoretical models of meaning and significance of place addressed two constructs: place identity and place dependence (Schreyer, Jacob, &White; 1981; Williams & Roggenbuck, 1989). Prohansky (1978) considered place identity as relating to the cognitive aspect of human understanding, describing it as serving "to define who, where, and what the person is, as well as

how he or she will behave" (p. 157) while considering place dependence as representing the conative aspects of human understanding much the same as Williams, Patterson, Roggenbuck and Watson (1992) defined place dependence as the ability of a setting to meet the goal expectations of the person or people who experience it. Subsequent research (Kyle et al. 2004, Low and Altman, 1992; Williams and Roggenbuck, 1989; Williams and Vaske, 2003) proposed a third construct—place attachment—which relates to the affective portion of human understanding of place. Smale (2006) argues that place attachment is not the same as place, as place attachment is simply an affective response to an experience that has been "facilitated by a person's presence in a place" which is independent of the meanings that might be attached to the place. To Smale's (2006) understanding, place attachment addresses a degree of importance of a place, but not the why or how the place is important; however**,** Relph (1976) writes of attachment or "rootedness" as identifying with a place based on the human need for security provided by deeply knowing a place that provides a base for dealing with the world which indicates that the attachment, while an affective response, is more than simply a degree of importance created by a human presence and instead an strong innate need to feel related and connected to the geography. Low and Altman (1992) proposed that despite the conceptual vagueness of place attachment, four process components exist that create place attachment: biological, environmental, psychological and sociocultural. Biological processes involve the "evolutionary and physiological adaptations of the human species to particular environments" which create a "people-place linkage"(p. 8) strongly supportive of Relph's (1976) position that place attachment is a deep connectedness to the geography which are mediated by the environmental processes which range from environmental constraints and opportunities, to interactions between technology and resources available in that geographic location (Low & Altman, 1992). Psychological and sociocultural processes refer to individual and group experiences in a particular geographical space which are the foundation for both individual and shared meaning creation which defines place (Low & Altman, 1992; Relph, 1976).

Sense of Place

Research in the human geography discipline (e.g. Relph, 1976) has developed an overarching concept, sense of place, which is referred to as place attachment in environmental psychology (e.g. Altman & Low, 1992) and is comprised of a tripartite framework inclusive of place identity, dependence and attachment constructs which provides for interplay of all three psychological components of affect, cognition and behavior

Early in place-based research, Relph (1976) identified three components of sense of place: 1). physical setting, 2). activity, and 3) human psychosocial interactions and processes operationalized in later work as identity (Prohansky 1978), dependence and attachment (Williams, Patterson, Roggenbuck and Watson 1992), satisfaction (Stedman, 2002), meaning (Manzo, 2005), locus of daily life (Hay, 1998) and setting or "rootedness" (Greider & Garkovich, 1994 Relph, 1976,). Additionally, Shamai (1991) posits that sense of place has three developmental phases which provide that a person must initially feel a sense of belonging to a place, after which the individual will develop attachment to the place, and finally, exhibit commitment to a place. These are not succinctly delineated phases, but instead exist on a continuum of sense of place development that ranges on a scale from one's knowledge of being located in a place to personal sacrifice for a place (Shamai, 1991).

Some quantitative support for sense of place was demonstrated in Jorgenson and Stedman's (2001) study of lake property owners to assess sense of place via conventional models of attitude structure. Opting to forego the phenomenological approach and adopt an empirical approach using a 5-point Likert scale, results indicated that sense of place as an overarching concept better explained the beliefs, feelings and behaviors than a domain-specific construct of attachment, dependence and identity, although utility of this approach rests on the validity of the individual constructs (Jorgenson & Stedman, 2001). However, a number of researchers (Altman

& Low, 1992; Hay, 1998; Hidalgo & Hernandez, 2001, Scannell & Gifford, 2010; and Shamai, 1991) have determined that sense of place is a complicated phenomenon that "lies in the beholder's sense and mind" (Shamai, 1991, p. 354) and has a number of variables making it very often difficult to explain with the current methodological tools and empirical measurements available to researchers. Yet, as Low and Altman (1992) assert, sense of place remains an important characteristic of human existence as sense of place creates daily feelings of security and control in our lives, provides stimulation and succor through social aspects in the place, allows linkages between past and present, values and beliefs, community and nation, manifested in the unique human interpretation of experiences within a physical space. By this reasoning, Hay (1998) advocates that research should focus on greater place-based understanding through sense of place research to assess not only the affective bond between the individual and the subject-object, but also the "subjective qualities (the sensing of place to create personal meaning) and social context in a geographical region, as well as community and ancestral connections to place" (p 7).

Place Protection

Considering the problem in environmental management, where often there is no technical solution or a feasible regulatory or policy approach solution to an environmental threat, sense of place has the potential to provide solutions through the integration of "the ontological realms of nature, social relations and meaning" to develop or encourage place protective behaviors with affected stakeholders (Williams and Patterson, 1996, p. 516). Tuan (1974) refers to mankind's affective response to the physical environment as "topophilia" and states that only those items of essential need for one's self, as determined by the self, are the ones valuable enough for mankind's efforts for protection and retention (Tuan, 1974). While Tuan (`1974) concedes that this affective response may "not be the strongest of human emotions"(p. 93) it is sufficient to

create a coupling of "sentiment with place" (p. 113) which provides for place protective expression.

In general, research has demonstrated (e.g. Manzo, 2005; Schultz, 2000; Stedman 2002; Vaske & Korbin, 2001) that individuals and groups who have positive and strong attitudes toward an attitude object, engage in behavior that supports or enhances the attitude object; however, one cannot assume that positive emotional attachment to a place will necessarily translate to environmentally responsible or supportive behavior, as the environment or place itself may not be the reason for the attachment. Manzo's (2005) research found that the people-place connection may be the variable needed to explain the contradiction between reported environmental concern and actual proenvironmental behavior as "complex relationships to these places develop on their own merit as experience and place become intertwined" (p.82). Stedman's (2002) work noted that attachment and satisfaction exert independent influences on intention to engage in place-protective behaviors: High levels of attachment with low levels of satisfaction are better predictors of willingness to act to counter environmental threats than either place attachment or place satisfaction alone (Stedman, 2002). Conversely, Stedman et al. (2007) looked at the place perceptions regarding five North American temperate lakes, along with five European temperate lakes, and noted that people "have the capacity to be attached to settings perceived as environmentally degraded" (p. 344) which suggests a weaker link between attachment and place-protective behaviors for environmental quality than previously understood. As Kaltenborn (1998) explained, sense of place appears to be an independent variable in human perception of environmental conditions, yet the relationship is complex providing more predictive information for reactions to environmental impacts as opposed to assessing individual perceptions of the environmental conditions. This multidimensionality of sense of place may explain the ability of individuals to adjust to degraded environments in which significant attachment and meaning exists, but only engages in place protective reactions depending on one's level of perceived

satisfaction with the environment (Manzo, 2005; Stedman, 2002). Some researchers (e.g. Relph, 1976; Tuan, 1974) also suggest this weak link between place attachment and place protective behavior in some instances may be attributable to differences in residential status. Relph, (1976) has strongly advocated that sense of place is only experienced fully by permanent residents which could suggest that seasonal residents cannot or will not have sufficient place attachment for place-protective behaviors to emerge as they are only landscape consumers with superficial experiences with the geography. Theory assumes that mobility creates weaker ties to a place, or a lack of rootedness (Relph, 1976), yet others (Williams, et al, 1992) posit that mobility may foster greater attachment as people have choices where to visit, thus the act of choosing to visit the same place repeatedly exhibits attachment (or other elements related to sense of place such as identity or dependence). Considering Shamai's (1991) assertions that sense of place has three developmental phases and is felt and expressed along a continuum ranging from complete unawareness to exhibiting a willingness to sacrifice for the protection of a place, one could conjecture that residential status may be a poor proxy for assuming an individual's level of commitment to a particular place and thus predict their propensity to exhibit place protective behaviors. However, there is empirical support for the hypothesis that environmentally responsible behavior is more frequent among those individuals who feel greater place attachment to their local environment (Vaske & Kobrin, 2001; Scannell & Gifford, 2010).The crux of the issue in determining the effect of sense of place on intention to act or actual behavior may be an interaction on multiple levels of personal cognition and affect between issue salience and extent and direction of the attachment (Scannell & Gifford, 2010) as well as one's values, beliefs and attitudes regarding the natural environment (Thompson & Barton, 1994; Kortenkamp & Moore, 2001; Stern, Dietz & Black, 1985; Heberlein, 1972; Dunlap & Van Liere, 1977; Stern, Dietz & Kalof, 1993; Stern, Dietz, Kalof & Guagnano, 1995).

Environmentally Responsible Behavior

Social human behavior is based in the development and expression of an ethical foundation that serves as an internal guide for cooperative social living and self-preservation through values (Batson, 1994; Leopold, 1949; Schwartz, 1977). As described by Aldo Leopold (1949), "An ethic, ecologically, is a limitation on freedom of action in the struggle for existence. An ethic, philosophically, is a differentiation of social from anti-social conduct" (p. 202). Leopold (1949), in a review of the evolution of ethical behavior as a product of cooperative human behavior, explains that the first human ethics were centered on relations between individuals and later progressed to relations between an individual and society; ethics were a guiding force for regulating human behavior for the mutual benefit of autonomous individuals. However, under the dominant social paradigm, the environment is regarded as a commodity to be managed for the benefit of the individual who controls it. In Gough, Scott and Stables' (2000) review of O'Riordan's (1989) seminal publication "The Challenge for Environmentalism", two major ethical worldviews of mankind's relationship with nature are established: one worldview provides an ecocentric or nurturing view of society-nature relationships and another provides an anthropocentric perspective in which competition with and the utility of the environment dictate the terms of man's relationship with nature. Aldo Leopold (1949) has long asserted that the human-environment relationship is one of privileges to mankind, but no obligation for stewardship and protection while Rachel Carson (1962) lamented the effect that human exceptionalism had on the environment, creating an illusion that mankind was somehow separate from nature instead of intrinsically interconnected and dependent upon it. This is the presiding foundational cause for much of the environmental degradation existing in the world today (Carson, 1962; Leopold, 1949). As a result of the writings of Rachel Carson (1962), along with increasing activism for regulatory control of industrial pollution, and a heightened awareness of health impacts from degraded environments, Dunlap and Van Liere (1978) discovered the

emergence of a New Environmental Paradigm (NEP) in regard to the human-environment relationship wherein an interdependence and respect of the environment was a central theme, as opposed to the Dominant Social Paradigm (DSP) that regarded the environment as a resource available for domination and utilization—a commodity, but not an entity.

Sterba (1994) proposes a reconciliation of the two divergent worldviews of anthropocentrism and ecocentrism through the development of three foundational principles consisting of human defense and human preservation, whereas actions deemed necessary to protect and preserve human life are allowed even if it requires aggression against other forms of life to meet our basic needs, along with a third principle referred to as disproportionality which provides that any actions to satisfy non-basic or luxury human needs are prohibited. At the heart of the issue for reconciliation of these two separator worldviews is subjective valuation of the environment. This valuation, created by infinitely unique individual and collective human qualities, determines our innumerable and varied attitudes and perspectives on our environment and our response to that physical world (Tuan, 1974).

Few studies have addressed the issues of anthropocentrism and ecocentrism; although, Kortenkamp and Moore (2001) examined moral reasoning about ecological dilemmas and noted the most frequently elicited moral reasoning in the dilemmas was related to human relationships and not the environment; knowledge about environmental impacts induced the participants to think more about the environment, but did not change the ethical position which remained highly anthropocentric.(Kortenkamp & Moore, 2001). Corraliza and Berenguer's (2000) study indicates that a significant number of individuals experience conflict between their disposition toward pro-environmental behavior and situational conditions they experience or perceive. "It has been demonstrated that strong feelings of moral obligation for carrying out a pro-environmental behavior are only determinant for that behavior when favorable attitudes toward the realization of responsible behaviors do not enter into conflict with high situational inhibition. Similarly, low

feelings of moral obligation do not necessarily imply an absence of pro-environmental behavior, because the physical conditions that influence such behavior may be perceived as faciliatory" (Corraliza & Berenguer, 2000. p. 845-846). As Dake (1992) explains, attitudes and values regarding the human-environment relationship develop through cognitive perceptual lenses. Applying cultural theory, Dake (1992) explains that through cultural bias which is an expression of shared values and beliefs, humans justify their different ways of behaving in relation to the environment.

As a result of the interaction of innumerable conflicting variables, situational and dispositional, Stern (2000) proposes that environmentally significant behavior should be defined not only on an impact basis (i.e. the extent to which a behavior changes resource availability or alters the environment), but also from an intent-orientation defined as behavior undertaken by an actor with an intent to affect a beneficial impact. By regarding intent as an independent variable, while acknowledging that the intent "may fail to result in an environmental impact" allows that environmental education can address behavioral changes by both targeting specific behaviors, as well as focusing on beliefs, motives, values and social and personal norms (Stern, 2000, p. 408). Finding educational strategies to encourage a different valuation structure in the current dominant social paradigm of anthropocentrism is increasingly important as monitoring and regulating individual behavior through the typical command and control structures historically utilized for environmental protection, have proved to be exceedingly inefficient and ineffective due to the magnitude of resources required for implementation and enforcement, along with the vehement distaste for this type of governance in the United States (Vandenbergh, 2005). Additionally, various economic incentives and tax schemes are highly unpopular when applied to individuals and present hurdles to effective administration and application, thus truly effective regulation of environmentally responsible behavior in individuals must derive from an individual's internal moral orientation that concedes that the natural environment has intrinsic

value beyond commoditization for human needs (Vandenbergh, 2005).. As such, individual environmentally responsible behavior in a modern society may be substantially dependent on educating to a moral standard that provides for ethical consideration toward the environment (Bell, 1994; Carson, 1962; Hungerford & Volk, 1990; Leopold, 1949; Stern, 2000).

Theoretical Foundations for ERB Motivation

As early environmental behavior research has generally answered the question of whether people care about the environment, more recent research has approached the issue of why people care about the environment. This approach implicitly considers motivational aspects in environmental behavior, as one of the most basic and generalized definitions of motivation as an inferred behavior is taken from Bernard, Mills, Swenson & Walsh (2005) wherein "[m]otivation refers to the *why* that causes an organism to initiate and persist in certain behaviors as opposed to others" (p.134).

Approaching the why of environmentally responsible behavior from a Gestalt psychology perspective considers that human behavior, from a holistic viewpoint, incorporates both extrinsic and intrinsic motivations to explain behavior (Merriam, Caffarella, & Baumgartner, 2007). Extrinsic motivations involve motivational incentives and disincentives for a particular behavior which mirrors behaviorist learning perspectives as the individual develops a motivational and ultimately moral orientation on external factors, while intrinsic motivations are dispositional-based or internally generated based upon understanding the meanings of culturally-constructed norms and values that have been internalized, much in the manner of cognitive social learning elements (Gibbs, 1991). An internal orientation is representative of a mature individual and is requisite of modern social living; whereas an adult with only an external moral orientation may be judged to be developmentally delayed (Gibbs, 1991), but importantly, external moral orientation is the type of motivational basis addressed by government regulation which exacts

punishment or grants incentives to behave in an environmentally responsible manner as determined by the consenting public. While beyond the scope of this literature review, there are two major contemporary theories in the discipline of developmental psychology to explain the development and motivational properties of personal norms—Kohlberg's 1984 cognitive moral development theory that attributes moral development to cognitive development and reasoning ability and Hoffman's 1983 theory based on moral socialization which is based primarily in the affective development of empathy (Gibbs, 1991; Thøgersen, 2006). Hoffman's 1983 theory aligns with a behaviorist learning theory perspective for behavior as social norms typically reinforce how an individual should act based on either the threat of sanctions or promise of rewards (Gibbs, 1991), but as Thøgersen (2009) notes these can be subjective and shallow motivational drivers until the social norm is internalized and integrated into a personal norm which is similar to Kohlberg's cognitive moral development theory. There is some empirical evidence from persuasive communication research that suggests that "elaborate reasoning and reflection leads to a stronger evaluative construct (norms in this case) that are more predictive of behavior" (Thøgersen, 2009, p. 349). This may be due to the effect that reasoning creates a strong integration in the individual cognitive structure through the assimilation and accommodation process (Ausubel 1967) where new information is assimilated and existing cognitive structures are accommodated (Merriam, Caffarella, & Baumgartner, 2007;Schunk, 2008). A prodigious amount of research in environmental psychology has evaluated the dispositional motivational basis for environmentally responsible behavior and developed two accepted behavioral models, specifically Schwartz' (1997) Norm Activation Model (NAM) and Stern, Dietz and Kalof's (1999) Value-Belief-Norm model (VBN).

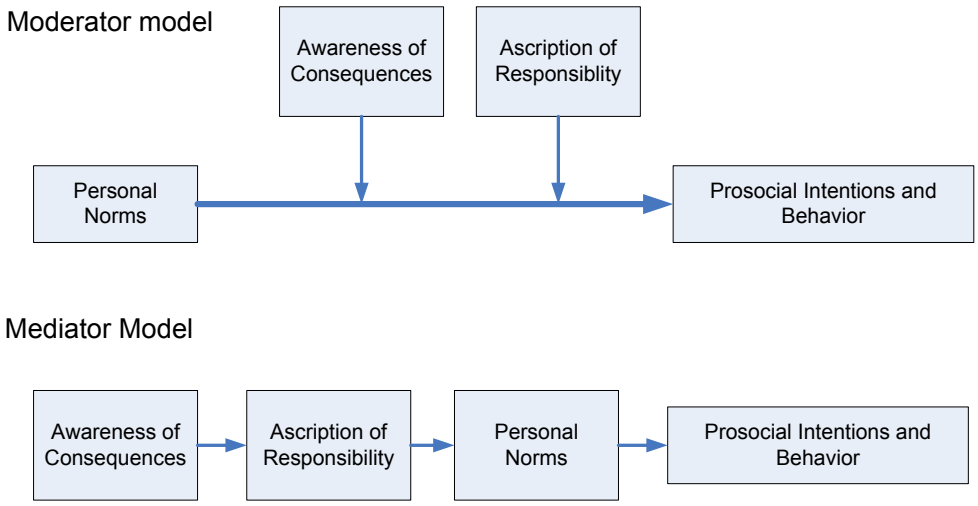
Schwartz's Norm Activation Model (1977) considers socially-relevant, personal behavior as an outcome of beliefs regarding the consequences of actions and personal and social norms surrounding ascription of responsibility to take action. In relation to social cognitive theory,

Schwartz's (1977) Norm Activation Model (NAM) reveals similar foundations for ethical dispositions guiding one's chosen behavior based on both social and personal cognitive qualities. Originally developed to explain altruistically motivated behavior, Schwartz's (1977) theory states that the activation of benevolent or charitable norms is most likely to occur when an individual is aware of the positive consequences of rendering assistance and ascribes responsibility to him or herself for performing the requisite behavior. The NAM has successfully demonstrated predictive ability in a number of health-related situations, such as donating blood and bone marrow and helping in emergency situations as well as showing significant promise in environmental contexts (e.g. energy conservation, recycling, willing to pay for environmental protection) (DeGroot & Steg, 2009). Comprised of three variables—personal norms (PN) (referencing one's moral conscience for action or inaction), awareness of consequences (AC) which denotes one's awareness of negative consequences toward others or other things that one values and ascription of responsibility (AR) which is defined as "feelings of responsibility for the negative consequences of not acting prosocially"—the NAM does not definitely dictate the relationship between the variables of PN, AC and AR; therefore two interpretations have arisen in the social and environmental domains (DeGroot & Steg, 2009, p. 426) (Figure 1).

The Moderator model suggests that PN's is moderated by the effects of AC and AR, while the Mediator model assumes a direct linear relationship effect beginning with AC as a predecessor for AR which functions as an antecedent to PN that directs prosocial behavior (DeGroot & Steg, 2009). DeGroot and Steg's (2009) research, which examined the variable's relationships in five different scenarios, indicates stronger support for the mediator model than the moderator model; however, the empirical data is comprised of self-reported behavior and prosocial intentions instead of actual observed behavior which is a limiting factor in the strength of the results. Nevertheless, DeGroot and Steg (2009) agreed with Stern (2000) that "each

variable in the chain directly affects the next and may also directly affect variables further down the chain" (Stern, 2000. p. 413) and that "one must be aware of the consequences of behavior

Figure 1--Interpretations of Schwartz' (1977) NAM



Source: DeGroot & Steg, 2009.

before feeling responsible to engage in this behavior or acknowledging that one's own contribution may be useful" (DeGroot & Steg, 2009, p. 443). However, Schultz and Zelezny (1998) believe that the Moderator model is more representative of the relationship between PN, AC and AR on prosocial behavior particularly when individuals are highly aware of the consequences of not acting in a socially acceptable manner (AC) and who feel intensely responsible for the consequences of their behavior (AR). Alternately, Schultz and Zelezny's (1998) research noted that those individuals with low AC and AR may respond to a problem by denying its existence or a personal responsibility to address the issue thus demonstrating a moderating impact to their personal norms through the effect of AC and AR and a negative affect to demonstration of prosocial behavior. One issue with much of the research on NAM variables

lies with the definition of AR; some researches (e.g. Schwartz, 1977) define it as "the responsibility for the consequences of the problem", others (e.g. Van Liere &Dunlap, 1978) describe AR as "the extent to which a person believes he or she can make a useful contribution to the solution of the problem" which extends the variable definition into the area of self-efficacy or locus of control (DeGroot & Steg, 2009, p. 429).

However, while values serve as the "guiding principles in a person's life" directing one's behavioral choices, (Schultz & Zelezny, 2003 p. 126 citing Schwartz, 1992; Schwartz and Bilksy 1987), inconsistency between values and behavior do arise, particularly if there is a dissonance between cultural and personal values and the consequences or effects of a requisite behavior (Schultz & Zelezny, 2003). Too often, the environmental movement's message of environmentally responsible behavior has been framed as an either/or conundrum of tradeoffs, ignoring the relationship of personal values to lifestyle choices. Schultz and Zelezny (2003) discuss the disconnect between American cultural values that embrace the elements of personal success, material wealth and personal accomplishment and the requisite altruistic or personal norm motivational schema for environmentally responsible behavior. As such, environmental messages framed to suggest that environmental behavior requires sacrifice (or self-transcendent values) is not particularly persuasive to the American majority (Schultz & Zelezny, 2003 p. 131; see also DeYoung, 1990 and Kaplan, 2000). Altruism, in its purest definition, constitutes thinking or acting on behalf of the welfare of others where self-interest is wholly precluded and subordinate (Kaplan, 2000). However, noting historical demonstration that self-interest or egoistic motivation as a powerful human motivational force, Kaplan (2000) implores society to accept motivational reality that humans rarely behave counter to their own self-interest; thus "altruism must coincide with self-interest sufficiently to prevent the extinction of either the altruistic motivation or the altruist" (p. 495) or in other words, one must accept that the anthropocentric ethic is the most effective and socially acceptable means toward environmentally

responsible behavior under the current dominant social paradigm that considers the environment as a commodity for utilization toward material wealth and comfort. However, developing an approach to environmental protection that coincides with the dominant social paradigm of anthropocentric personal and cultural norms is only one step in addressing environmental attitudes; environmental beliefs provide another potential obstacle toward encouraging environmentally responsible behavior.

Stern, Dietz and Kalof (1993) examined Schwartz's Norm-Activation Model and its assumption (by its reliance on an awareness of consequences and ascription of responsibility to activate social norms) that individuals have a general predisposition toward a type of altruism that at the very least compels avoidance of actions which will harm their fellow beings. Some studies (e.g. Black, Stern & Elworth, 1985; Stern, Dietz & Black, 1986; Stern, Dietz & Kalof, 1993; Stern, 2005) evaluating Schwartz's model have recognized that individuals calculate the trade-offs between altruistic motivations and the costs for acting on those motivations; particularly in regard to the environment. The Value-Belief-Norm (VBN) model links value theory, norm-activation theory, and the New Environmental Paradigm perspective through a relational chain of five variables that result in a behavioral response (Stern et al., 1999). Personal moral norms are influenced by the belief basis which is represented by awareness of consequences (AC) and ascription of responsibility (AR). The primary motivational driver posited in the VBN model (1999) is that the consequences which are judged to be important to an individual and will activate personal moral norms associated with action are those consequences with adverse or negative effects to an individual, society or the environment (Stern, et al., 1999; Stern, 2000). This model considers both dispositional variables in the context of attitudinal factors (e.g. norms, beliefs, values) and contextual variables (e.g. social expectations, economic constraints, availability and access to behavior supportive structures, political policies) noting the complex and diverse interdependent relations these variables can create in any behavior-response

consideration (Stern, 2009); unfortunately, both the NAM (Schwartz 1977) and the VBN (Stern, et al., 1999) focus on an altruistic-based internal norm as a motivational driver which may be implicitly flawed for one central reason—human motivation toward preferred behavior is a complex psychological process that defies reduction to a single determination (De Young, 2000, citing Mary Midgley, 1978). Additionally, both the NAM (Schwartz, 1977) and VBN (Stern, et al, 1999) fail to address personal utility or self-efficacy beliefs regarding the requisite behavior (Wall, Devine-Wright & Mill, 2008).

As previously discussed, human behavior is typically a situation-specific response which may best be explained by the cognitive consistency theory that proposes that motivation to behavior change is a resolution of cognitive tension between internal and external variables (Cottrell & Graefe, 1997; Hungerford & Volk, 1990; Schunk, 2008). Additionally, balance theory (Schunk citing Heider, 1946) postulates that individuals need to cognitively balance all the elements of person, situation and events which may account for the noted discrepancies in activation of ascription of responsibility wherein individuals unable to balance the tensions between awareness of consequences and personal norms enter into a denial state (Schwartz, 1973; Van Liere & Dunlap, 1978; Schunk, 2008). Alternately, cognitive dissonance theory (Schunk citing Festinger, 1957) may explain the same denial process that interrupts the linear model of NAM or VBN as this theory proposes that humans "attempt to maintain consistent relations among their beliefs, attitudes, opinions, and behaviors" (Schunk, 2008).

In the late 1980's Hines, Hungerford and Tomera (1987) noted that despite extensive research into the causal correlates of environmentally responsible behavior, no agreement among researchers had emerged as to which variables appear to be the most strongly associated with environmentally responsible behavior and as such, they conducted a meta-analysis of all previous research on correlates of environmentally responsible behavior. The meta-analysis (Hines, et al. 1987) was divided into four variable groupings: cognitive variables (e.g. awareness of issues and

consequences, skill knowledge); psycho-social variables (e.g. locus of control, attitude, personal responsibility); demographic variables (e.g. age, gender, income), and experimental studies (e.g. incentives, appeals). Results indicated that greater knowledge of environmental issues and knowledge of how to take action has a positive correlation (r=.299) to environmentally responsible behavior, and that among the psycho-social variables, attitude, locus of control and personal responsibility emerged as the strongest correlates (r=.347, r=.365, and r=.328 to environmentally responsible behavior (Hines, et al., 1987). In regard to locus of control, the results noted that "individuals who have an internal locus of control were more likely to have reported engaging in responsible environmental behaviors than were individuals exhibiting a more external locus of control" (Hines, et al, 1987, p. 5). Internal locus of control was defined, based on work by Peyton and Miller (1980) as an individual's belief that "their activities are likely to have an impact" while an external locus of control is an individual's perception that change in a condition is based on chance or "powerful others" such as governmental institutions or God (Hines, et al. 1987, p. 4). Schunk (2008) notes that locus of control is a "central tenet to most cognitive motivation theories" since people tend to seek some measure of control over their lives (p. 475). Referencing work by Rotter (1966), the delineations of external and internal locus of control are significant in how they relate to achievement contexts and hence affect behaviors as part of outcome expectations which as emphasized in Bandura's (1986) work, "are important determinants of achievement behaviors" but are not necessarily the only determinant (Schunk, 2008, p. 476).

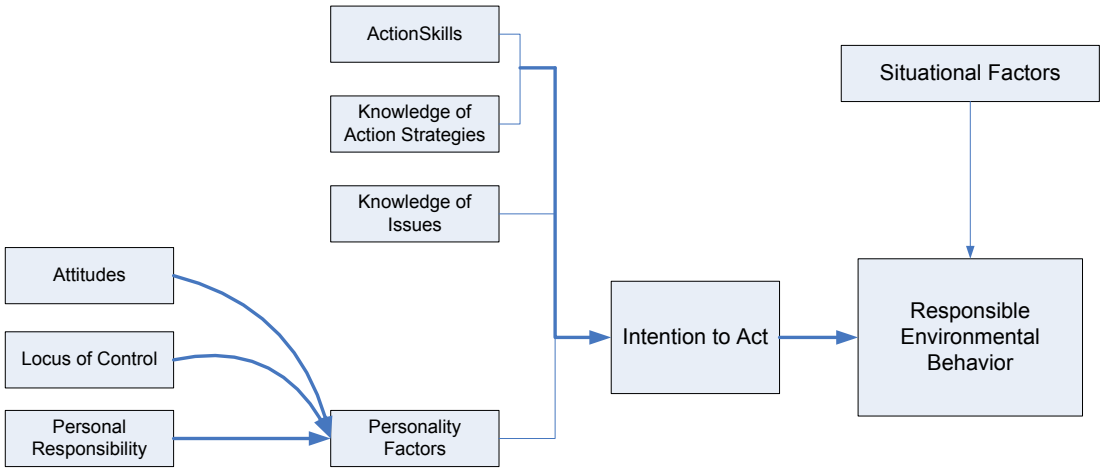
As a result of the meta-analysis, Hines et al. (1987) formulated a model of environmentally responsible behavior (Figure 2). The model proposes that "intention to act is merely an artifact of a number of other variables acting in combination" among which are cognitive knowledge, cognitive skills, and personality factors, locus of control and ascription of responsibility (Hines, et al. 1987 p. 6). An individual must have knowledge of the issues and

applicable actions as well as possess some efficacy in the requisite action skills before an intention to act can potentially be formulated.

In the context of environmental issues, awareness of the issues is usually realized in some measure of risk perception on the part of an individual and research has shown support that belief or perception of environmental risk on individual health and well-being encourages environmentally responsible behavior (Baldassare & Katz, 1992; O'Connor, Board, & Fisher, 1999). As Slovic (1997) notes, risk is a subjective, assumption-laden construction of our individual and collective psyches which is utilized to assist in the comprehension and handling on uncertainty in our lives, often attributed to a pollutant or a technology that is considered to pose a threat to human health and well-being (Slovic, 1997;Wilkdavsky & Dake, 1990).

Figure 2--Hines, Hungerford and Tomera (1987) Model

Model of Responsible Environmental Behavior



Source: Hines, Hungerford, & Tomera, 1987

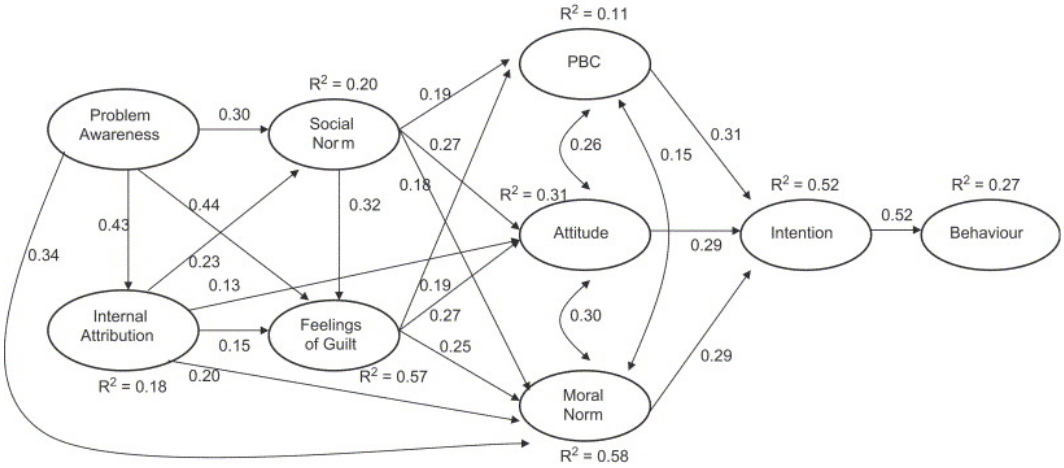
However, research has also revealed that individuals tend to "overestimate negligible risks and to neglect truly significant ones" (Burger & Gochfeld, 1991, p.269) and risk is also highly embedded in social contexts which influence risk perception "through a network of

socially mediated communication channels" (Masuda & Garvin, 2006, p. 438). Despite considerable work investigating the human variables (e.g. gender, age, occupation) of risk perception, very little work has considered geographic variables of risk, in particular place attachments where the culture within the day-to-day, taken-for-granted experiences impact risk perceptions as events occur in-place (Masuda & Garvin, 2006).

In this context, Masuda and Garvin (2006) noted that risk perception is both attenuated and amplified as risk information is assessed through social network communication channels which facilitate a cultural perspective on the risk of a particular threat as it affects individuals' sense of community belonging and well-being of their community as a whole. This process can create divergent views on the risk of a particular threat despite a shared social construction of the risk (Masuda & Garvin, 2006). This complicates the Hines, Hungerford, and Tomera (1987) model as awareness of consequences is constructed as an independent variable on intention to act, but does not recognize that personality factors (e.g. attitude, values and beliefs) may influence the cognitive construction of knowledge of the issues and the associated risk perception. In the case of Masuda and Garvin's (2006) research, residents were more likely to amplify risk, while non-residents attenuated the risk, which was attributed to meaning assigned to the place. According to this research (Masuda and Garvin, 2006) there may be some interaction between an individual's knowledge of the issues and awareness of consequences in an environmental problem and their sense of place. Hines, et al. (1987) concede that while the research indicates that when cognitive variables of knowledge and skill intersect with favorable personality factors the individual should demonstrate or express an intention to act, human behavior can never be consider so linear as situational factors (e.g. economic constraints, social pressures) are an independent variable on that can interrupt the pathway (Hines, et al., 1987). That interruption may be the social amplification or attenuation of risk perception on knowledge of the issues more than intention to act.

Bamberg and Moser (2007) revisited the premise of the Hines, et al. (1987) model and conducted a new meta-analysis citing the significant amount of research work conducted since the Hines, et al. (1987) results were published. Their results, based on pooled random-effects correlations, support the assessment that problem awareness, while important in the Hines, et al. (1987) model, may not be a direct determinant of environmentally responsible behavior as it is affected by moral and social norms, along with guilt associated with internal attribution of responsibility (Bamberg and Moser, 2007).

Figure 3--Bamberg and Moser (2007) Model of Environmental Behavior



Bamberg and Moser (2007) provide a more cognitive-based model (Figure 3) suggestive of a constructivist process of assimilation and accommodation than previous linear models to explain antecedent interaction and effect on intention to act; however, they still represent a direct affect from intention to act to actual behavior, discounting the possibility of situational variables that would provide contextual influence on human behavior.

Phenomenology

As evidenced by the above review of major theories of human motivation and behavior as well as models for predicting human behavior, there is great difficulty in definitively quantifying human cognition, affect and ultimately behavior in the human-environment relationship from a

traditional positivist research approach. Positivism asserts that "genuine knowledge must be perceptible in time and space and thus is founded on empirical reality and validity" and is represented by objectivity, quantification, explanation, prediction, control, replication and public verifiability (Seamon, 1982, p. 120). Its primary purpose is to explain phenomena through theories, models, frameworks, variables and the evaluation of variations and correlations (Seamon, 1982). Since the latter part of the 20th century, the disciplines of environmental psychology and sociology have belabored to provide empirically-based identification of antecedents of environmentally responsible behavior and explain their interaction and effect on human motivation to behavior in a manner that could determine whether our environment is sufficiently capable of sustaining our future survival; the results have only proved that the human-environment relationship is a complex and multi-faceted operating in multiple dimensions of cognition, affect and behavior. As Buttimer (1976) reminds us, positivist approaches "record facets of experience as emanating from a past, but shed little light on direction or meaning" (p. 278). As such, there is growing support for employing phenomenological research methodologies to the people-environment relationship or as Seamon (1982) expressed so eloquently "the need is a return to the foundations of meanings, things, and experiences, and to describe those foundations accurately and clearly" because all group and individual behavior and decision-making derives from the latent foundations of subjective meaning (p. 119; see also Ley, 1976).

Phenomenology is the exploration of meanings which humans attribute to the every-day items and experiences of their life (Buttimer, 1976; Ley, 1977; Seamon, 1982). These meanings are ubiquitous and pervasive, but rarely acknowledged and even less investigated and clarified on a conscious level by individuals or groups. Phenomenology looks at the assumed, but unquestioned aspects of human social and psychological attitudes, beliefs and values in their "life-world" existence. As Seamon (1982) expressed, "there are as many phenomenologies as there are things, events and experiences in the world…" (p. 119). The primary difference between

phenomenology and positivism is understanding versus explanation (Seamon, 1982). The phenomenologist strives to empathetically define and understand the person-environment relationship with no a priori assumptions; "phenomenology is primarily eidetic" as it seeks to understand the inner patterns and essences of day-to-day existence within unique objective structures (Seamon, 1982, p. 121). In looking for the "natural attitude" in the taken-for-granted everyday life, phenomenology as a discipline is suspicious about causality as "life may simply be one vast interconnected, interpenetrating synergism" (Seamon, 1982 p.123). The discipline also rejects positivisms reliance on certitude, noting that "existence is ambiguous, filled with light and dark" which makes for an argument that attempting to demonstrate prediction may at the very least be impossible and at the most, an exercise in vanity or hubris on the positivist's part (Seamon, 1982, p. 123).

A number of researchers (Buttimer, 1976; Fishwick & Vining, 1992; Hutson & Montgomery, 2010; Ley, 1976; Manzo 2005; Seamon, 1982; Shamai, 1991) advocate for a phenomenological approach to researching the human-environment relationship in order to capture the subjective meanings assigned to places. Conducting a qualitative study of person-place relationship in human decision-making for choice of recreational activity, Fishwick & Vining (1992) asked 18 participants to complete a series of 'decisions' about where to visit while recording the thought process that participants used to describe thoughts and feelings that influenced their decision. Past experience heavily influenced a participant's decision and participants exhibited significantly different "life-worlds" (Fishwick & Vining. 1992). Manzo (2005) utilized qualitative in-depth interviews of 40 individuals to explore the nature of their emotional relationships to the places in their lives. Her findings noted that experiences that are meaningful and important to people usually result in an emotional bond to the place in which the experience occurred, both positive and negative. However, places are not merely markers or virtual repositories for the significant experience, but instead "complex relationships to these

places develop on their own merit as experience and place become intertwined" (Manzo, 2005, p.82). Finally, Hutson and Montgomery (2010) utilized Q-method to identify three different place meaning perspectives of recreationists utilizing the Niagara Escarpment: Spirituality Seekers, Intensity Seekers, and Sense of Self Seekers. Although the authors note that the findings are not generalizable to larger populations specifically due to the nature of phenomenology as a personal interpretation of the everyday experience unique to individuals and community groups, the results offer an additional contextual dimension toward our understanding of social phenomena surrounding the Niagara Escarpment (Hutson & Montgomery, 2010).

The focus of this research will be a phenomenological study, utilizing Q-methodology, to assess the perceptions of pollution issues on Grand Lake, and to discern potential educational pathways and obstructions to increased environmentally responsible behavior among watershed residents. As the literature review supports, empirical models provide some initial guidance on variables to human motivation toward environmentally responsible behavior, but only in the specific context of day-to-day life-world, can understanding of the actors perspective emerge which can provide the key to promoting behavioral change.

CHAPTER III

METHODOLOGY

In order to discover perceptions of the Grand Lake water quality issue in relation to the activation of personal motivational antecedents of environmentally responsible behavior, a phenomenological course of study was pursued utilizing Q-methodology. Introduced in 1935 by British physicist and psychologist, William Stephenson, Q-methodology is designed to examine subjectivity from a systematic, quantitative means. Central to Q-methodology is self-reference (McKeown and Thomas, 1988). Self-reference is the internal frame of reference an individual uses to anchor their point of view on a subject thus providing an object subject to systematic research and interpretation (Hutson, et al., 2010; McKeown & Thomas, 1988). In order to discover the subject's subjectivity, a researcher provides a platform—a Q-sort—that enables the respondent to display their perspective on a particular matter or issue (McKeown & Thomas, 1988). By systematically rank-ordering a purposively designed number of stimuli—a Q-sample—in response to a condition of instruction, the respondent provides a model of his or her viewpoint (McKeown & Thomas, 1988).

Use of Human Subjects

Any research utilizing human subjects must be reviewed by the Institutional Review Board (IRB) at Oklahoma State University (OSU). Approval from the IRB was secured before data collection was commenced. A copy of the approval letter is provided in Appendix A.

Participant Sample

Participants for this study were purposively selected from residents within the Grand Lake watershed, primarily those residing within one-quarter of a mile from the Grand Lake shoreline. A combination of personal association with the researcher and snowball sampling technique was utilized to recruit participants for the study. The individuals comprise the P-set. Participants were contacted personally by the researcher based on personal knowledge of their status as a Grand Lake property owner and requested to participate in the Q-sort process. Participants were given information on the study (Appendix B) and consent was implied by their willing participation in the study.

Q Methodology

Q-methodology originated in the 1930's from William Stephenson's desire for an empirical framework to discern and evaluate subjectivity in behavioral research (Barry & Proops, 1999; Coogan & Herrington, 2011; McKeown & Thomas, 1988). With an established presence in social sciences (Coogan & Herrington, 2011), Q-methodology is appropriate when there is a need to illuminate or know points of view or perceptions on a subject or issue; the purpose is the exposure and articulation of self-referent subjectivity (McKeown & Thomas, 1988). As such, the data are considered in "terms of the individual's whole pattern of responses" (Coogan & Herrington, 2011, p. 24) rather than seeking patterns between subjects, as one would in utilizing analysis techniques for traits, preferences, opinions and other variables attributed to the human subject (Barry & Proops, 1999; Coogan & Herrington, 2011; McKeown & Thomas, 1988). For the purposes of this study, Q-methodology's ability to identify perspectives on environmental issues is vitally important, since environmental issues generate discourses that provide information for individuals to form value judgments and behavior intentions through social cognitive construction of knowledge. Until the issue discourse is understood, socially acceptable

solutions to the environmental issue are difficult to develop and implement (Barry & Proops, 1999).

Q methodology versus R-Factor Analysis

Traditional factor analysis techniques are grounded in the positivist philosophy of creating knowledge in the world. Positivist research's primary purpose is to explain phenomena through theories, models, frameworks, variables and the evaluation of variations and correlations (Seamon, 1982). However the positivist approach entails a researcher imposing a priori assumptions, laws, theories and concepts to the subject which can be argued brings a measure of cynicism to the results that may be more "an artificial product of a manipulative intellect forcing real world processes and events into a set of imposed and arbitrary cerebral constructs" than valid empirical knowledge (Seamon, 1982, p.121).

Q-methodology is primarily a phenomenological research device, but also utilizes factor analysis; however, the factoring is not across traits and test results by individuals, but instead a factoring of each individual's entire ranked statement response (Barry & Proops, 1999; Brown, 1993; Coogan & Herrington, 2011; Dziopa & Ahern, 2011; McKeown & Thomas, 1988). As Brown (1993) explains "the statements are matters of opinion only (not fact) and the fact that the Q-sorter is ranking statements from his or her own point of view is what brings subjectivity into the picture."(p. 94-95). McKeown and Thomas (1988) note that some researchers have inferred that the "person versus trait distinction" creates an inverted Q-factor analysis; however, early practitioners quickly discounted this assertion when correlation linearity was noted to be missing when transposed data matrix did not provide common units of measurement (McKeown & Thomas, 1988). In Q-methodology, all observations "are premised on a common unit of measurement, namely, "self-significance" (McKeown & Thomas, 1988, p. 48).

Despite the differences in application of factor analysis techniques, both R-methods and Q-methodology employ factor analysis; however, one (R-method) provides generalizability to the population while the other (Q-methodology) "provides a unique opportunity to distinguish salient groupings within the population with similarly structured attitudes" toward an object or issue (ten Klooster, Visser, & de Jong, 2008, p. 516). As an example, in a study comparing results from both a Q-sort and a 5-point Likert attitude questionnaire on images of beef conducted by ten Klooster et al. (2008), the Q-methodology identified three salient groups of people with different attitudes toward beef, while the Likert attitude questionnaire provided generalizable data regarding demographic perceptions of beef (i.e. male respondents were more positive about beef than female responders). The Likert scale data is appropriate for an organization to compare the results with competing organizations or products and identify indicators of differences based on demographic variables; however, the Q-methodology data offers the opportunity to understand the attitude groups within the population from a content-specific basis (i.e. people who like beef produced in the conventional manner and believe beef is important to national image as opposed to those who like beef but only if it's raised humanely and find no relation to national image) (ten Klooster, et al. 2008). Both strategies are essential to research, but have different purposes and render wholly different research result perspectives (Brown, 1993; McKeown & Thomas, 1988; ten Klooster et al., 2008).

Concourse Development

Concourse development is the aggregation of the various discourses on a subject. A discourse is a "way of seeing or talking about something" (Barry & Proops, 1999, p. 338) or as Brown (1993) explains, it is "the communicability surrounding any topic" (p. 94). He further describes concourse as:

> …the very stuff of life, from the playful banter of lovers or chums to the heady discussions of philosophers and scientists to the private thoughts found in dreams and diaries. From concourse, new meanings arise, bright ideas are hatched and discoveries are made: it is the wellspring of creativity and identity formation in individuals, groups, organizations and nations… (Brown, 1993, p. 95).

Concourses are derived from any number of sources, including interviewing individuals, researching news reports, commentaries, diaries, essays, and other communication forums (Brown, 1993). From the identified discourses within the concourse which should aim to be diverse and inclusive of as many discourses as can be derived or revealed, sample statements reflecting the varied discourses are extracted and become the Q-set or sample which will be utilized in the Q-sort (Brown, 1993). The discourse for this study has been derived from theoretical foundations in sense of place and place protection research (e.g. Stedman, 2002), review of various comments on internet news articles on the Grand Lake water quality issue as well as derived from a similar study of perceptions of the Illinois River watershed water quality conducted to assess policy options (Focht, 2002). A total of 68 statements were collected and were analyzed to determine if they were representative of an ascription of responsibility, locus of control (including external and internal), knowledge, Sense of Place and Place Protection and motivation. These 68 statements were reduced to a total of 36 statements comprising the Q-set (Appendix C).

Research Procedure

To guide the participant in sorting the statements in the Q-set, a condition of instruction was developed (Brown, 1993). This is usually a very simple request that the participant sort the Q-set statements on a sorting array board according to those items “most like” or “most unlike” their position, opinion, feeling or idea as personally determined in relation to the condition of

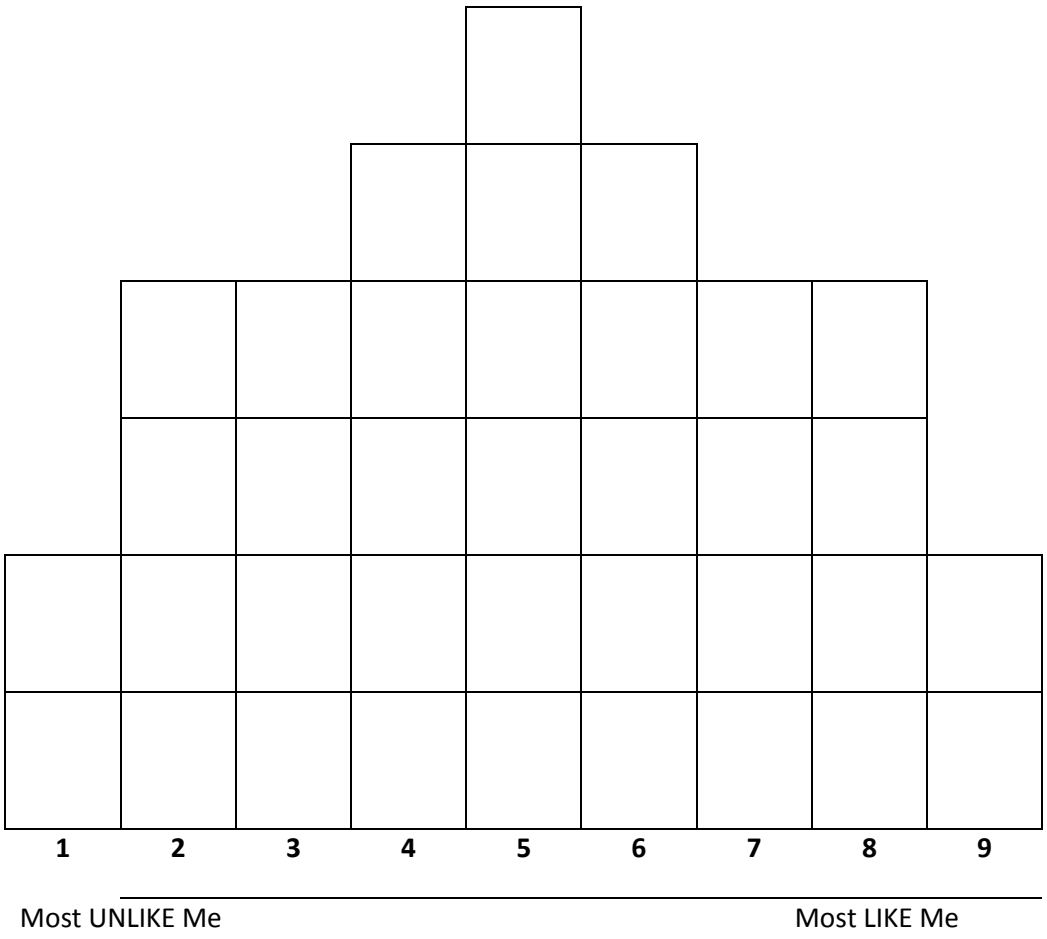
instruction (Brown, 1993; McKeown & Thomas, 1988). The condition of instruction can also be used to operationalize the hypothetical construct of the study by describing a scenario and asking the participant to respond by sorting the Q-set accordingly (Brown, 1993). In this study, the condition of instruction asked participants to relate their feelings, perspective, opinions or thoughts on the subject of Grand Lake and its water quality in relation to blue-green algae outbreaks during July 2011. The participants were instructed to consider the condition of instruction and then read through an unordered group of 36 numbered statements, sorting the statements into three piles according to whether the statement related to a feeling, opinion or perspective "most like them", "most unlike them" or evoked a neutral or undetermined response. This provisional sorting action is a "way station" towards assisting the participant in the process of completing the final Q-sort (Watts & Stenner, 2012. p. 84).

After participants completed the initial provisional sort into three piles, they were asked to rank order then statements on the Q-sort array form (Figure 4) by choosing a determined number of statements per column on the form, alternating from side to side on the form, starting with column 9 and switching to column 1. The sorting continued in order of columns 8, 2, 7, 3, 6, 4, and finally column 5, until all statements were placed on the form, each time the participant was asked to consider the remaining statements in relation to "most like me" or "most unlike me" in relation to the condition of instruction. In this manner, participants are forced to compare every statement and assign a value to the statement in placing it in a certain column on the Q-sort array form. The number of cells assigned value columns 1 through 9 resembled a modified bell-curve and were stacked as follows: 2, 4, 4, 5, 6, 5, 4, 4, 2. (See Figure 4).

After all statements were placed on the Q-sort array form, participants were given a chance to review the arrangement of statements and make any changes that they felt were needed before being asked to record the statement numbers directly onto a separate form with an identical Q-sort array form, which provided the raw data for analysis by factor analysis through

the use of the statistical program PQMethod (Schmolck, 2002). Data collection time varied for each individual, but ranged from 20 minutes to 45 minutes.

Figure 4--Q-Sort Array



Once the Q-sort was completed and recorded, the participants were asked to complete a demographics questionnaire (Appendix D) on the opposite side of their recorded Q-sort which asked for information on age, gender, race, education level, and property ownership, along with questions related to the individuals awareness of water quality issues and initiatives, connection to the Grand Lake community, and preferred type of recreational activities. The questionnaire

also included two open-ended questions asking the participant to describe what they believed was the most important environmental issue affecting Grand Lake water quality, and if there were any comments they would like to make regarding the statements that were presented to them for sorting.

Participants were asked if they would volunteer to be contacted by phone for a follow-up interview regarding their Q-sort, providing only a first name or code name in order to preserve confidentiality along with a phone number. Both face-to-face and phone interviews were conducted in October 2012. Specifically, a face-to-face interview was conducted with participants number four and nine for verification and further clarification of factors one and four respectively, and a phone interview was conducted with participant number five for verification and clarification of factor number two. Efforts to contact participant 18 regarding factor number 3 were unsuccessful, as well as were efforts to contact participant number 15 who, after factor rotation, was the one pure loading participant (factor one) for the four factor solution (0.8105, 0.0525, -0.0530, -0.0249).

Data Analysis

The individual completed Q-sort is a "publicly accessible form" of a participant's operant subjectivity or expressed viewpoint in relation to the Q-set items (Watts & Stenner, 2012. p. 26). It is essential to understand that the final Q-sort and the sorting of Q-set items are intractably related in that the viewpoint or perspective only makes sense relative to the environment or the objects in which the perspective or viewpoint was derived; "Viewpoints have no existence in the absence of some behavioral engagement with their object…" (Watts & Stenner, 2012, p. 27). The process of sorting Q-set items is the behavioral engagement that elicits the operant subjectivity captured in the Q-sort.

After acquiring the completed Q-sorts, the scores were entered into PQMethod 2.11 (Schmolck, 2002) a basic DOS statistical program available for free at www.qmethod.org. Primary to Q-method is the factoring of whole sorts as opposed to individual traits or variables such as in R-method analysis; however, once the Q-sorts have been correlated, "the mathematics of the factoring process are virtually identical to those followed in R-method applications" (McKeown & Thomas, 1988, p.49). The results from this study were produced by correlation of the Q-sorts, determination of levels of significance and use of centroid factor analysis combined with Varimax and hand-rotation of factors. PQMethod 2.11 (Schmolck, 2002) provides a correlation matrix (Appendix E) which is the foundation for determining the extent to which each Q-sort is related to each and every other Q-sort (Watts & Stenner, 2012). This correlation matrix is representative of 100% of the meaning and variability present in the study, or otherwise referenced as the study variance (Watts & Stenner, 2012). Factors derived from the correlation matrix are representative of common variance (i.e. shared meaning) present in the data (Watts & Stenner, 2012). Factor extraction is the process of removing common variance from the correlation matrix (Watts & Stenner, 2012). PQMethod 2.11 (Schmolck, 2002) offers two options for factor extraction: Principal component analysis (PCA) or centroid factor analysis. Principal component analysis mathematically seeks the best answer or solution, while centroid factor analysis, or simple summation method which allows for all possible solutions to be evaluated by the researcher for a best solution, although very often the two methods will provide similar results (McKeown & Thomas, 1988; Watts & Stenner, 2012). However, as Watts and Stenner (2012) note it is important as a Q methodologist to allow oneself the opportunity to "properly explore the data" through application of theoretically formed abduction in factor rotation decisions which can best be achieved through centroid factor analysis (p. 99).

In this study, based on an initial investigatory principal component analysis demonstrating four potential factors with Eigenvalues (EV) greater than 1.0 and a fifth factor with

an EV greater than 0.95, a centroid factor analysis was performed seeking a five-factor solution. Watts and Stenner (2012) discuss the use of EV as part of the decision-making criteria, stating that while EV is an indicator of a factor's strength and explanatory power statistically and can be used as starting point for factor decisions, one should be cautious in relying too extensively on EVs as final determinants for defining factors as one may end up with a number of meaningless factors with high EVs while eliminating other meaningful factors with low EVs.

Varimax rotation was performed on the centroid five-factor solution revealing only four factors with significant factor loads. Significance level at $P< 0.01$ for factors was determined by the following equation: $2.58 \times 1/\sqrt{36}$ (no. of items is Q-set) = 0.43. Standard error (SE) for this study equals 0.17 ($SE=1/\sqrt{6}$ (no. of items in Q-sort). In order to further refine the perspective and reduce confounding on factors 1 and 2, a minor hand rotation of 9 degrees clockwise was performed on factor 1 eliminating confounding for sorts number 1, 13, and 14. Confounding occurs when a single Q-sort loads significantly on two or more factor solutions.

Varimax rotation with subsequent hand rotation is advocated as a "best of both worlds" process by Watts and Stenner (2012. p. 126). Varimax rotation is statistically designed to maximize explained study variance which ensures that it will reveal viewpoints that most will recognize or consider important; it is "drawn towards the crowds" (Watts & Stenner, 2012, p. 125). However, its weakness is that it may miss the more subtle or original perspectives which are often revealed by hand-rotation. Hand-rotation is particularly useful in unique factor determination when a previously identified participant's Q-sort is considered a crucial perspective due to the individual's power or influence regardless of what other participants may be think or feel, but this same method may be too cumbersome or daunting for large data sets and novice Q methodologists (Watts & Stenner, 2012).

After identification of factors, Q-methodology requires factor interpretation which is conducted in terms of factor loadings (Brown, 1993). Statements are returned to their original Q-sort format for each factor where the researcher can discern differences in statement loadings based on their location in the Q-sort format and surrounding statements (Brown, 1993).

Understanding that factor groups represent a shared viewpoint or perspective from individual sorts that have been intercorrelated and subjected to factor analysis, individual sorts within a factor group loading as significant indicate a shared similar sorting pattern that represents the factor group (Watts & Stenner, 2012). By merging the significant loading sorts, an ideal ranked arrangement of statements is constructed by the size and rank order of the determined z-scores (factor scores) for each statement in relation to the particular factor, creating a factor array for each factor which represents the viewpoint for a particular factor (Watts & Stenner, 2012). Factor scores are basically mean scores for any statement; factor scores demonstrating statistical significance are considered as distinguishing statements (Brown, 1993; McKeown & Thomas, 1988). It is the location of distinguishing statements in relation to other statements and their position on the sorting array that creates the foundation for subjective interpretation (Brown, 1993; McKeown & Thomas, 1988). Factor interpretation begins with a holistic review and consideration of the pattern of statements in each factor array (Watts &Stenner, 2012).

CHAPTER IV

ANALYSIS OF DATA

The objective of this chapter is to provide results from the statistical analysis and qualitative interpretation of the study data. The purpose of this study was to describe the perceptions of Grand Lake watershed stakeholders toward the water quality issue and their role and responsibility toward watershed improvement. To this end, the study results address the following research questions:

1. What attitudes and perceptions are taken for granted regarding the Grand Lake water quality issues and efforts to improve the watershed?
2. What do the patterns of discourse reveal about motivation to participate in the desired behaviors for watershed improvement?

Participant Demographic Profile

Nineteen individuals qualified as Grand Lake Watershed stakeholders, participated in this study. Each was asked to complete a demographic questionnaire (see Appendix D) as part of the Q-sort process. The participants were highly homogenous as to age and race, and nearly equally divided by gender (ten males and nine females). Reported education levels reflect an educated populace with over two-thirds of the participants reporting completion of a minimum post-secondary education level of an Associate Degree. Only one participant self-identified as retired.

Nearly all the participants reported owning property on the Grand Lake shoreline as

opposed to only owning property within the watershed with average years of ownership equaling 11 years. Property ownership ranged from three years to 30 years, with a median value of 8 years of ownership (See Table 1). The participants were not asked to identify as either a full-time year round resident or a part-time seasonal resident. Ten participants reported having previously received information regarding Grand Lake water quality issues, and only one participant reported not having considered environmental impacts to Grand Lake. Nineteen Q-sorts were entered into PQMethod 2.11 (Schmolck, 2002) statistical analysis program and five centroids

Table 1-Participant Demographic Profiles

Participant	Gender	Age range	Race	Education level	Retired?	Length of Ownership	Shoreline Property?
1	M	50-59	W	BA/BS	N	2.5 yrs	Y
2	F	50-59	W	AA/AS	N	3 yrs	N
3	F	50-59	W	BA/BS	N	4 yrs	Y
4	F	50-59	W	BA/BS	N	10 yrs	Y
5	F	30-39	W	AA/AS	N	7 yrs	Y
6	F	50-59	W	BA/BS	N	12 yrs.	Y
7	M	60+	W	BA/BS	N	12 yrs	Y
8	M	50-59	W	HS	N	20 yrs	Y
9	M	60+	W	BA/BS	N	10 yrs	Y
10	F	50-59	NA	AA/AS	N	4 yrs	Y
11	M	60+	W	HS	N	25 yrs	Y
12	M	50-59	W	HS	N	5 yrs	Y
13	M	60+	W	HS	N	25 yrs	Y
14	F	60+	W	HS	Y	30 yrs	Y
15	M	50-59	W	BA/BS	N	3 yrs	N
16	F	50-59	W	HS	N	3 yrs	N
17	M	30-39	W	BA/BS	N	6 yrs	Y
18	F	40-49	NA	AA/AS	N	8 yrs	Y
19	M	30-39	W	Doctorate	N	20 yrs	Y

NOTES: Gender: F=Female; M=Male
Race: W=Caucasian, NA=Native American
Education Level: BA/BS=Bachelor degree; AA/AS=Associate Degree; HS= High School Diploma

were extracted from the raw data inputs. Four centroids, accounting for 61% of the variance, were rotated by Varimax with subsequent hand rotation on factor one and factor two. The four factor solution matrix (Table 2) included no non-significant sorts and only one confounded sort (Q-sort #19). There were no identified bi-polar factors, but factors one and two are correlated above the level of significance ($0.43=p<0.01$) (See Table 3). Hand rotation on factors one and two was conducted to clarify each factor's perspective and discern subtle but significant differences in the perspectives.

Table 2--Four Factor Q-Method Solution

Q-sort	Factor 1	Factor 2	Factor 3	Factor 4
1	0.7074*	0.3601	0.0494	0.3247
2	0.5762*	0.2761	0.2915	0.0443
3	0.7881*	0.2803	0.2326	0.0018
4	0.7919*	0.0333	0.0800	0.2923
5	0.3794	0.6953*	0.0471	0.2582
6	0.7850*	0.1849	0.0749	0.0167
7	0.7129*	0.1827	0.2162	0.3711
8	0.7728*	0.1958	0.0929	0.2017
9	0.1386	0.1604	0.2381	0.4477*
10	0.2975	0.6576*	0.0141	0.0940
11	0.6252*	0.0505	0.0277	0.2216
12	0.6374*	0.2399	0.1980	0.1069
13	0.6403*	0.3710	0.3600	0.1367
14	0.5721*	0.4057	0.0883	0.2725
15	0.8105*	0.0525	0.0530	0.0249
16	0.7357*	0.2158	0.1666	0.0602
17	0.2929	0.6259*	0.0296	0.1303
18	0.0483	0.0643	0.7578*	0.1726
19	0.5985	0.6315	0.1758	0.0285
% of Explained Variance	38	13	6	4
*=Significant or defining Q-sort for the Factor				

Table 3--Factor Correlations

Factors	1	2	3	4
1	1.00	0.5462	-0.1314	0.1957
2	0.5462	1.00	0.0622	-0.1344
3	-0.1314	0.0622	1.00	-0.2022
4	0.1957	-0.1344	-0.2022	1.00

Factors

Factor 1: Aware, Ready to Help, but Seeking Information

Primary to this factor's perspective is a high level of ascription of responsibility for the problem and the solution to this problem along with a strong internal locus of control for resolving the problem (Item 23, +4). Comprised of the majority of the participants (13), this factor embraces the attitude that all of the pollution sources can be addressed and managed to affect a positive impact in the lake's water quality in relation to blue-green algal blooms and that everyone in the watershed can contribute to resolving the issue (Item 25: +3). They believe that with proper, informed guidance a solution can be derived and implemented (Item 24; +2), while rejecting the ideal that the blue-green algal blooms are an unpredictable condition of the environment outside of mankind's control (Item 21: -3). This pattern of item ranking (Figure 5), as well as item 24's identification as a distinguishing statement at the $p<0.01$ level reflects a predominant sense of internal locus of control for resolving the problem.

The level of knowledge or awareness of the issue appears higher than other factors, but there is an overriding desire for accurate information and relevant education to facilitate environmentally responsible behaviors which could reduce phosphorus-loading and other pollution (i.e. fecal contamination) in the Grand Lake Watershed (Item 3: +4). This assertion is supported by statement three's designation as a distinguishing statement at the $p<.01$ level for this factor (Table 4).

This factor inclusively and equally ascribes responsibility for the lake's water quality issues to multiple sources (Item 8: -3; Item 4: +1) and holds a strong attitude of collective responsibility for the lake and the watershed property (Item 6: -4). For instance, this factor ranked the State of Oklahoma's ascription of responsibility to address the issue (Item 7: -1) as less than any other factor's ranking of this item and ranked agriculture's ascription of responsibility for contributing to the problem (Item 5: -1) as higher than any other factor's ranking for the same statement, but these two statements were ranked equally by factor one. A follow-up interview with one participant regarding this result revealed that the equal ranking within this factor may be based on an expressed aversion to higher levels of governmental regulatory control and involvement if one ascribes more responsibility to the State of Oklahoma. Additionally, there may be a desire, perhaps even a belief, that the issue can be resolved through cooperative efforts by locally involved stakeholders who, in one participant's opinion, should exhibit personal responsibility for this issue since all are bound by a common pool resource. This appears to be reflected by the factor's equal ranking (+1) of item 13 ("We need to reduce use of products with phosphates, like less fertilizers and different detergents that can make a difference") and item 14 ("Funding will be required to initiate upstream projects to reduce agricultural and commercial contributions to the nutrient loading of Grand Lake") as well as the same ranking for item number four ("I think every person who's on this lake has made some contribution to the problem since phosphorus is in everything—fertilizer, soap, the soil—you name it").

This factor strongly rejected item nine ("Kansas is turning Grand Lake into a toilet bowl; the EPA is responsible for fixing this, not us") along with item eight ("The pollution all originates upstream of Grand Lake so why should I be required to do something?") and item 19 ("The government's the only one who can take some action to fix the water quality). Again, seeking verification of this factor's interpretation that problem resolution should be at a local level and handled by assertion of personal responsibility for the issue, a face-to-face interview with

participant number four confirmed the interpretation as well as revealed that there may be a knowledge gap regarding the contribution of upstream jurisdictions to the phosphorus loads entering the watershed; however, additional information rendered by the researcher regarding the upstream contributions of municipal wastewater treatment facilities and industrial dischargers did not appear to change participant number four's perspective that local control of the resolution is appropriate. The overriding theme for this factor's perspective on a solution appears to be one of limited governmental control in the solution and conformance with a social norm of personal responsibility towards preservation of the commons.

Figure 5--Factor 1 Array

				36				
			33	35	14			
	21	31	28	34	13	27	32	
	19	18	11	22	12	26	**30***	
15*	9	17	7	20	4	**24****	29	23
6	8	16	5	10	1	2	25	**3****
-4	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**

*=Distinguishing Statements (p< 0.05)
**=Distinguishing Statements (p<0.01)

While this factor exhibited a higher knowledge level of the issue than other factors, there appears to be some room for improvement in the general knowledge of the issue, including sources of pollution, effects of excess phosphorus in freshwater systems, and feasibility and effectiveness of proposed solutions. Specifically, this factor provided a neutral ranking for item

10 (“Phosphorus comes from wastewater, lawn fertilizer, poultry litter and it’s in nature itself. It’s the elevated part that causes the problem”) and only moderately rejected the items 16, 17 and 18, ranking all items the same (-2). Face-to-face conversation during the post-sort interview revealed that there was a lack of certainty as to how phosphorus affects the water quality and whether level thresholds are important or even what is considered “normal” for lake water quality. Participant four commented “Factual statements @ 100%” on the demographic questionnaire to the open-ended question 16 “What else would you like to say about the ideas on the statements you sorted?” which in the follow-up post-sort interview revealed that this participant felt that all the statements should be factual on the Q-sort since it was difficult to know what was correct or incorrect as far as knowledge statements. Despite the general lack of knowledge about pollution sources, there was near unanimous attribution of septic systems and wastewater treatment systems along the shoreline to the water quality issue. It was difficult by the construct of the question “What do you think is the most important environmental issue affecting Grand Lake water quality?” (See question 15, Appendix D), to discern whether the participants related improperly functioning, leaking septics directly to the blue-green algal bloom issue or if the participants are more concerned about fecal bacterial contamination; nevertheless, it demonstrates by a preponderance of evidence that water quality related to human waste inputs is a highly salient issue to these participants.

This factor expressed high levels of place protection to the Grand Lake area (Items 29 and 30; +3), but did not rank as high on Sense of Place items (Items 26, 27, and 28); however, they ranked protection of their lake property value as high on their priority list (Item 32; +3) which may be related to the incongruity between sense of place and place protective attitudes. Overall, this factor was indifferent or neutral to items related to intrinsic motivation (Items 34, 35 and 36; 0) and ranked only one item related to extrinsic motivation on the positive side of the

Table 4—Six Highest Ranked Statements, Six Lowest Ranked Statements and Distinguishing Statements for Factor 1

No.	Statement	Z-Score
	Six highest ranked statements for factor 1 (most-like)	
3	We all need to get educated about the issue and learn what to do to help the situation since we use this lake.	*1.87
23	The leaky septic systems, bad city and town sewer systems, the use of chicken litter as a fertilizer to the industrial polluter, can all be controlled and make a difference.	1.261
25	Truth be told, everyone in this watershed can do something to help fix the problem.	1.258
30	I'm really concerned about Grand Lake's future and feel I need to do something to preserve it.	1.158
29	Water quality issues don't just threaten the environment here at Grand Lake, but also the unique culture and recreation of this place.	1.107
32	Protecting my lake property value is a huge incentive for me to learn about ways to protect the lake water quality.	1.081
	Six lowest ranked statements for factor 1 (most-unlike)	
6	It's our land; I guess we have the right to do what we want with it regardless of water quality.	-1.894
15	The only reason water quality is an issue is because the media is making it an issue.	-1.834
21	Humans can't really affect the environment because it's beyond our control.	-1.632
8	The pollution all originates upstream of Grand Lake so why should I be required to do something?	-1.565
19	The government's the only one who can take some action to fix the water quality.	-1.296
9	Kansas is turning Grand Lake into a toilet bowl; the EPA is responsible for fixing this, not us.	-1.255
	Distinguishing statements for factor 1	
3	We all need to get educated about the issue and learn what to do to help the situation since we use this lake.	*1.87
30	I'm really concerned about Grand Lake's future and feel I need to do something to preserve it.	1.16
24	This problem is fixable if we follow the guidelines for reducing phosphorus; we can make a difference.	*0.92
15	The only reason water quality is an issue is because the media is making it an issue.	-1.83
P<.05; asterisk * indicates significance at p<.01		

factor array (Item 32; +3). Price thresholds for phosphate-free products did not rank high (Item 33; -1) and a financial incentive for septic-system replacement was ranked even lower (Item 31; -2). It appears that the threat to one's financial investment in property may be one motivational driver for issue salience in resolving the lake water quality issue.

Factor 2: Committed and Protective, but Unsure

Factor two has an Eigenvalue of 1.5019 unrotated and accounts for 13% of the study variance after factor rotation. Three participants (one male and two females) significantly loaded on this factor; the highest significant correlation is 0.6933 and the lowest significant correlation is 0.6259. Participant 19 confounded on this factor and factor one, but loaded higher on factor two (factor one: 0.5985; factor two: 0.6515). Of the three participants that loaded significantly on this factor, two were identified in the youngest reported age group in this study (30-39 years age). Interestingly, participant 19 was the only other youngest age group participant (age group 30-39) in the study. The average years of property ownership of the three significant sorts is 5.67 years as opposed to an average of 11.9 years for factor one. While this factor is significantly correlated with factor one (0.5462) (See Table 3), there is a subtle but significant difference to this perspective in the ranking of statements related to Sense of Place and Place Protection (See Figure 6).

This factor ranked item 26 ("I consider myself a Grand Laker"), item 27 ("Grand Lake is a special community that I like being a part of; it feels so much like a hometown"), and item 28 ("I tried other lakes, but none of them seemed to meet my recreation needs like Grand Lake") higher than any other factor's ranking of these items, as well as ranking item 29 ("Water quality issue don't just threaten the environment here at Grand Lake, but also the unique culture and recreation of this place") at +3 which equaled factor one's ranking of the same item. This factor, unlike factor one, has a strong, overriding Sense of Place and place protective attitudes related to

preserving the Grand Lake area as a unique community that they are personally attached to, identify with, and are dependent on for meeting their personal needs and goals. This point is strongly supported by a z-score of 2.103 on item 27 and 1.730 on item 26 with differences between factor one z-scores on the same items equaling -1.154 and -0.837 respectively demonstrating the difference between factor two and factor one perspectives despite their high correlation with each other.

Figure 6--Factor 2 Array

				36				
			22*	35	30			
	21	17	18	33	28	34	32	
	19	13	16	24	20	25	**31****	
6	**15***	11	8	9	14	23	29	**27***
2	**10***	5	1	4	7	3	12	26
-4	-3	-2	-1	0	1	2	3	4

*=Distinguishing Statements (p< 0.05)
**=Distinguishing Statements (p<0.01)

Another distinction between this factor and factor one is the ranking of ascription of responsibility items (Items1, 2, 3, and 4). A review and comparison of z-scores for ascription of responsibility items, indicates that factor two does not ascribe responsibility for the water quality issue and solutions with as much parity as factor one. This is exemplified by z-scores for item two ("We, the Grand Lakers, have done a reasonable job of acting like an Ostrich with our heads in

the sand") of -1.73 (See Table 5) as compared to factor one's z-score of 0.73 for a difference of 2.457 between the two factors for the same statement, or by statement one ("Oklahoma can't blame other states for the problem until we get our act together setting a maximum amount of nutrient allowed in the water") with z-scores of -0.54 for factor two and 0.56 for factor one resulting in a difference of 1.105 between the two different perspectives on this same item. However, this factor was aligned with factor one on item six regarding land use rights in ascription of responsibility, ranking it as a -4 ("most-unlike") with only a 0.036 difference in z-scores. A post-sort phone interview with participant number five, who was the highest significant loader on this factor (0.6933) confirmed the perspective of non-parity of ascription of responsibility. She explained from her perspective that everyone contributes at some level (some more than others), but everyone should have to help solve the problem regardless of the frequency or contribution level of discharge.

Factor two also demonstrated a greater ambivalence and uncertainty in the knowledge or awareness items. Specifically, factor two ranked item 10 ("Phosphorus comes from wastewater, lawn fertilizer, poultry litter and it's in nature itself. It's the elevated part that cause the problem") at -3 position on the factor array with a z-score of -1.243 for a between factor difference of 1.518. Yet, factor two perceives a high interconnection between lake water quality and tourism dollars in the Grand Lake community (item 12), ranking the item at position 3 in the factor array, for a z-score of 1.424 for a between factor (factor 1 vs. factor 2) difference of -0.846. The higher ranking of concern or awareness regarding the effect of lake water quality on the community's economy is also supportive of this factor's greater identification and attachment to the Grand Lake community.

Another distinction for this factor is a greater propensity towards extrinsic motivation devices as represented by items 31 and 32. Item 32 ("Protecting my lake property value is a huge incentive for me to learn about ways to protect the lake water quality") at a z-score of 1.577 had

Table 5--Six Highest Ranked Statements, Six Lowest Ranked Statements, and Distinguishing Statements for Factor 2

No.	Statement	Z-Score
	Six Highest Statements for Factor 2 (most-like)	
27	Grand Lake is a special community that I like being a part of; it feels so much like a hometown.	2.103
26	I consider myself a Grand Laker.	1.730
32	Protecting my lake property value is a huge incentive for me to learn about ways to protect the lake water quality.	1.577
12	We need to protect the water quality of the lake in order to keep tourism dollars coming into the community.	1.424
31	I'd like to replace my septic system but I need the state to pay for it or give me a tax write-off.	1.299
29	Water quality issues don't just threaten the environment here at Grand Lake, but also the unique culture and recreation of this place.	1.232
	Six Lowest Ranked Statements for Factor 2 (most-unlike)	
6	It's our land; I guess we have the right to do what we want to with it regardless of water quality.	-1.930
2	We, the Grand Lakers, have done a reasonable job of acting like an Ostrich with our heads in the sand.	-1.730
10	Phosphorus comes from wastewater, lawn fertilizer, poultry litter and it's in nature itself. It's the "elevated" part that causes the problems.	-1.243
21	Humans can't really affect the environment because it's beyond our control.	-1.090
15	The only reason water quality is an issue is because the media is making it an issue.	-1.079
19	The government's the only one who can take some action to fix the water quality.	-1.071
	Distinguishing Statements for Factor 2	
27	Grand Lake is a special community that I like being a part of; it feels so much like a hometown	2.103
31	I'd like to replace my septic system but I need the state to pay for it or give me a tax write-off.	*1.730
22	A lake management plan is worthless without regulations to enforce it.	-0.53
15	The only reason water quality is an issue is because the media is making it an issue.	-1.079
10	Phosphorus comes from wastewater, lawn fertilizer, poultry litter and it's in nature itself. It's the "elevated" part that causes the problems.	-1.243
P<.05; asterisk * indicates significance at p<.01		

only a minor significant difference (-0.496) with factor one; however, item 31 ("I'd like to replace my septic system but I need the state to pay for it or give me a tax write-off") has a Z-

score of 1.299 for a significant difference of -2.204 between factors one and two. While factor one appears to have a dedicated interest in their property value as might be expected if the property is considered as an investment asset, factor two's interest in financial incentives for motivation appears to be more day-to-day pocketbook economics.

Factor 3: Detached, Independent and Unaffiliated with Lake Recreation.

Factor three has an unrotated Eigenvalue of 0.9170 and accounts for six percent of the study variance after factor rotation. It has only one significant load at 0.7578 by participant 18. While this factor's recognition and interpretation is limited by the singular load and an Eigenvalue of less than 1.00, Q-methodology provides latitude to investigate and include this factor (Brown, 1980; Watts & Stenner, 2012) as "the major concern of Q-methodology is not with how many people believe such-and-such, but with why and how they believe what they do" (McKeown & Thomas, 1988, p.45).

Demographically, this individual self-reports herself as a non-retired Native American in the 40-49 years of age range with an education level of Associate's degree. She has owned shoreline property in the Grand Lake area for over eight years and lists limited lake recreational pursuits of cookouts with family and friends as well as fishing. Interestingly, this individual listed Lake user behavior as the most important issue affecting Grand Lake stating, "I see the problem is in how people treat the environment when they come to visit. They don't live here and they abuse it", which indicates that this individual may be a full-time, year-round resident as opposed to a second-home owning, seasonal resident although the demographic questionnaire did not ask participants to classify their residential status. As such, this individual may represent a meaningful and essential perspective based on the demographic profile. Efforts to reach this individual for a post-sort interview were unsuccessful as the contact information provided did not provide a functioning phone number; however, this researcher contends that the uniqueness of the

factor array requires consideration and interpretation of the participant's perspective which may provide a platform for future investigation of this demographic group.

This factor adheres to a low level of personal and/or local ascription of responsibility regarding the water quality issue at Grand Lake (Item 6: +4; Item 9: +1; Item 1: -2: Item 3: -1), coupled with a lower level of awareness and knowledge pertaining to the issue (Item 16; +2; Item 17; +3; Item 18: +2) (Figure 7) than the other identified factors. This factor's perspective embraces a strong extrinsic motivation towards participation in environmentally responsible behaviors to facilitate a resolution (Item 32; -4; Item 33; +3), and has a general rejection of place protective attitudes and intrinsically motivated behaviors for environmental protection of the area. Primary to this factor's perspective is a strong belief in landowner rights exemplified by the acceptance ("most like me") of item 6 and 32 at +4 ranking ("It's our land; I guess we have the right to do what we want to with it regardless of water quality" and "Protecting my lake property value is a huge incentive for me to learn about ways to protect the lake water quality"). Although in this factor's interpretation of item 32, it would be appropriate to believe the emphasis is on protecting the property value more than actually learning ways to protect lake water quality, due to the similar ranking of item 6, although the item can still be indicative of an extrinsic motivation basis for desired behavior.

The uniquely ranked combination of items related to personal ascription of responsibility and locus of control suggest that this perspective attributes lake water quality issues to upstream contributors and possibly to tourism-related lake development, and not particularly to local residential populations. This factor's perspective does not attribute the water quality issue to the agricultural industry's use of chicken litter (Item 5: -3) which is significant in the Oklahoma watershed, or that Oklahoma has an obligation to develop a phosphorus limit before upstream states can be held accountable (Item 1: -2). This perspective has a much greater focus than the

Figure 7--Factor Array for Factor 3

				30				
			29	28	25			
	35	31	24	13	18	27	**33****	
	34	19	23	10	14	26	**17***	
36**	11	2	21	8	9	22	15	32
20**	5	1	3	7	4	**16****	12	**6****
-4	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**

*=Distinguishing Statements (p< 0.05)
**=Distinguishing Statements (p<0.01)

other identified factors on the responsibility of upstream contributors to the problem and appears to feel that other entities are responsible for the solution (Item 9: +1 "Kansas is turning Grand lake into a toilet bowl; the EPA is responsible for fixing this, not us.". This perspective has a slight rejection of locally contextualized internal locus of control items (Items 23: -1 and Item 24: -1) lending support for the determination that this perspective might attribute greater responsibility to upstream pollution as the primary contributor to the issue. Thus responsibility and control falls to those jurisdictions for remediation of the problem, but this factor does not fully absolve downstream contributors from the problem. However, there is strong rejection of item 20 (-4) at a distinguishing statement level (p<.01) (See Table 6). "Until the State spends money to do inspections and make rules, the lake will continue to degrade" which may provide additional support for the interpretation that this perspective feels downstream contributions are

either minimal or attributable to downstream "others" such as tourist lake users. Therefore, spending for "inspections and rules" are not appropriately placed in Oklahoma, or in the alternative, this person is expressing a rejection of state intervention in private property (i.e. inspections and rules)and attribution of responsibility as a full-time resident. To rule out the rejection of additional State spending, this ranking was compared to item 14 regarding funding for upstream projects; this factor ranked item 14 exactly the same (+1) as all other factors, which supports the interpretation that the significant rejection of item 20 is related to the placement of the regulation and spending (downstream vs. upstream) as opposed to the idea of additional spending, and alludes to the interpretation that this factor may feel that tourism-related activities in Oklahoma are more responsible for the downstream contribution than full-time residents in the Oklahoma watershed area; therefore, this factor rejects the idea of additional regulatory burdens that would encompass full-time residents

Additionally, this factor provided a neutral ranking of item 8 ("The pollution all originates upstream of Grand Lake so why should I be required to do something?") which was ranked higher than any other factor. This ranking indicates a division point between this factor and the other factors while the relatively high ranking at +2 of item 22 ("A lake management plan is worthless without regulations to enforce it") lends support for the interpretation that this perspective feels that the burden for resolving this issue lies with others in upstream jurisdictions. There also appears to be some underlying frustration or cynicisms regarding lake management plans, which rely on voluntary actions by watershed residents and may again, allude to an underlying concern with tourism-related development and lake use. .

In regards to knowledge or awareness of the issue, this factor had a distinguishing statement ranking ($p<.01$) for item 16 ("I think it's just the weather; it's happening in all the lakes because they naturally have phosphorus") as well as rankings higher than other factors for items 15 ("The only reason water quality is an issue is because the media is making it an issue") and 17

Table 6--Six highest Ranked Statements, Six Lowest Ranked Statements and Distinguishing Statements for Factor 3

No.	Statement	Z-Score
Six highest ranked statements for factor 3 (most-like)		
6*	It's our land; I guess we have the right to do what we want to with it regardless of water quality.	1.774
32	Protecting my lake property value is a huge incentive for me to learn about ways to protect the lake water quality.	1.774
12	We need to protect the water quality of the lake in order to keep tourism dollars coming into the community.	1.330
15	The only reason water quality is an issue is because the media is making it an issue.	1.330
17	We know that there's urine and chemicals and chicken and cow poop in the lake; that's normal, and it's in every lake.	1.330
33*	If it were cheaper to use phosphate-free products, that would motivate me.	1.330
	Six lowest ranked statements for factor 3 (most-unlike)	
36*	I find it really pleasurable acting as a steward and advocating for our natural resources.	-1.774
20*	Until the State spends the money to do inspections and make rules, the lake will continue to degrade.	-1.774
35	Learning how to be more environmentally friendly at the lake gives me a great sense of personal satisfaction.	-1.330
34	The enjoyment I get from setting an example for my friends and neighbors motivates me to take action to protect the lake.	-1.330
5	The chicken processing plants and farmers spreading chicken poop on the fields in the watershed of our Oklahoma lakes is the culprit for the green algae.	-1.330
11	If the lake water quality gets much worse, people will quit coming to the lake because it'll be too unhealthy to get in the water.	-1.330
	Distinguishing statements for factor 3 (if not noted above)	
16*	I think it's just the weather; it's happening in all the lakes because they naturally have phosphorus.	0.89
17	We know that there's urine and chemicals and chicken and cow poop in the lake; that's normal, and it's in every lake.	1.330
P<.05; asterisk * indicates significance at p<.01		

("We know that there's urine and chemicals and chicken and cow poop in the lake; that's normal, and it's in every lake."). Additionally, this perspective rejects the idea that degrading water quality will affect tourism (Item 11: -3), and that lake water quality is related to the culture and recreation at Grand Lake (Item 29: -1), yet ranked the need to protect the influx of tourist dollars

into the local economy (Item 12: +3). This is a perplexing contradiction, but it appears that this perspective adheres to an idea that tourists will continue to use the lake regardless of water quality and related health concerns (perhaps adapting expectations and activities to accommodate degraded water quality), but to the extent that those tourist dollars are important to the community, efforts need to be made to protect the economy through protecting the lake tourism potential, still this perspective rejects the idea that the Grand Lake and the associated recreation is essentially linked to the culture and identity of the region and is more likely a peripheral element to the unique place identity.

Lastly, this factor wholly accepts (+4) item six ("It's our land; I guess we have the right to do what we want to with it regardless of water quality") which is in total opposition to factors one, two and four. Item six's ranking coupled with very low rankings associated with intrinsic motivation to protect the environment, particularly item 36 ("I find it really pleasurable acting as a steward and advocating for our natural environment") which is noted as a distinguishing statement ($p<.01$), indicates a potential utilitarian land-use viewpoint, or at a minimum, a strong individual landowner-rights perspective that disassociates personal property from the Grand Lake ecosystem and thus there appears to be no impetus for general place protection for the environment. Support for this interpretation arises from the neutral or indifferent ranking given to item 30 ("I'm really concerned about Grand Lake's future and feel I need to do something to preserve it.") and slight rejection of item 29 ("Water quality issues don't just threaten the environment here at Grand Lake, but also the unique culture and recreation of this area") in light of items 26 and 27 which were identical to those of factor two which is identified with a strong Sense of Place attachment and identity with the Grand Lake area. This factor is interested in protecting their own segregated land for their own personal use and control and does not view this land or its use in a holistic sense of impacts to the area.

Factor 4: Highly Informed and Aware, Desiring Regulation.

Like Factor three, Factor four has only one significant load; however, a review of the correlation matrix, communality matrix (Appendix F) and demographic questionnaire provides sufficient rationale for inclusion of this factor despite a low Eigenvalue (0.5562 unrotated), and only explaining four percent of the study variance. As Brown (1980) states, "the importance of a factor cannot be determined by statistical criteria alone, but must take into account the social and political setting to which the factor is organically connected."(p. 42).

Figure 8--Factor Array for Factor 4

				32*				
			34	29	36			
		31	33	30	26	21	25	22
		28*	24	**27***	23	15	18	20
	35	16	9	13	17	14	**11****	2	**19****
	6	8	5	**12***	4	3	10	1	**7***
	-4	-3	-2	-1	0	1	2	3	4

*=Distinguishing Statements (p< 0.05)
**=Distinguishing Statements (p<0.01)

Participant number nine is a 10 year seasonal resident who has participated in a number of meetings for the Windmill Run Homeowners' Association regarding septic system contamination of the area's drinking water supply. Additionally, from the face-to-face interview it was noted that this individual is a career environmental manager (educated as a chemical engineer) in the private-sector business arena. As such, his experience and training has placed this

individual as the subject-matter expert for residents of the Windmill Run condominium complex as well as other friends and family members who have stakeholder interests in the Grand Lake watershed. As a representative of the Windmill Run Homeowners' Association, this individual has also interacted with a number of officials representing the Grand River Dam Authority (GRDA) and the State of Oklahoma. With these points in mind, it is relatively apparent that this individual's perspective of the water quality issues in the Grand Lake watershed may be of essential importance as they have the weight of perceived and/or actual expertise behind them when communicated to others.

Primary to this perspective is the need to regulate and enforce (Item 19: +4; Item 1: +3) (Figure 8). While it may initially appear, due to low and neutral rankings on associated items, that this perspective rejects ascription of personal responsibility or an internal locus of control for solving the problem (Item 3; +1; Item 4: 0), this individual asserted that his focus is to get enforceable provisions to protect the water quality, not deny any responsibility for the issue. This is supported by the high positive ranking on item seven ("If the state wants to fix this problem, they need to do their job and inspect septics or pay to hook up city sewer systems on the lake"). However he admits that without a phosphorus standard for effluent discharges, he believes that the effect of remedial actions for shoreline sources will be miniscule. While item seven was a distinguishing statement at $p<.05$ for this perspective (See Table 7), the participant explained that he was disappointed at the failure of local State of Oklahoma officials to protect human health and the environment with the recent contamination of the condominium's groundwater drinking water source and adamantly believes that state officials should be working harder to enforce current regulations and controls. Supporting and aligning with the participant's face-to-face explanation of their perspective, the participant ranked the following items at +3: Item 2 ("We, the Grand

Table 7--Six Highest Ranked Statements, Six Lowest Ranked Statements and Distinguishing Statements for Factor 4

No.	Statement	Z-Score
Six highest ranked statements for factor 4 (most-like)		
7	If the State wants to fix this problem, they need to do their job and inspect septics or pay to hook up city sewer systems on the lake.	1.774
19*	The government's the only one who can take some action to fix the water quality.	1.774
1	Oklahoma can't blame other states for the problem until we get our act together setting a maximum amount of nutrient allowed in the water.	1.330
2	We, The Grand Lakers, have done a reasonable job of acting like an Ostrich with our heads in the sand.	1.330
20	Until the state spends the money to do inspections and make rules, the lake will continue to degrade.	1.330
22	A lake management plan is worthless without regulations to enforce it.	1.330
	Six lowest ranked statements for factor 4 (most-unlike)	
6	It's our land; I guess we have the right to do what we want with it regardless of water quality.	-1.774
35	Learning how to be more environmentally friendly at the lake gives me a great sense of personal satisfaction.	-1.774
16	I think it's just the weather; it's happening in all the lakes because they naturally have phosphorus.	-1.774
8	The pollution all originates upstream of Grand Lake so why should I be required to do something?	-1.774
28	I tried other lakes, but none of them seemed to meet my recreation needs like Grand Lake.	-1.774
31	I'd like to replace my septic system, but I need the state to pay for it or give me a tax write-off.	-1.774
	Distinguishing statements for factor 4 (if not noted above)	
7	If the State wants to fix this problem, they need to do their job and inspect septics or pay to hook up city sewer systems on the lake.	1.774
11*	If the lake water quality gets much worse, people will quit coming to the lake because it'll be too unhealthy to get in the water.	0.89
32	Protecting my lake property is a huge incentive for me to learn about ways to protect the lake water quality.	0.00
27	Grand Lake is a special community that I like being a part of; it feels so much like a hometown.	-0.44
12	We need to protect the water quality of the lake in order to keep tourism dollars coming into the community.	-0.44
28	I tried other lakes, but none of them seemed to meet my recreation needs like Grand Lake.	-1.33
P<.05; asterisk * indicates significance at p<.01		

Lakers, have done a reasonable job of acting like an ostrich with our heads in the sand"); Item 22 ("A lake management plan is worthless without regulations to enforce it"); and, item 20 ("Until the state spends the money to do inspections and make rules, the lake will continue to degrade").

The participant displayed a greater understanding of the issue and level of knowledge than other factors (Item 10: +2; Item 11: +2), although he appeared to accept item 21 ("Humans can't really affect the environment because it's beyond our control") with a ranking of +1. Further discussion rendered the explanation that while the environment is not solely within our control, we do affect it so the participant felt he could only agree with a portion of the statement. This perspective was mostly indifferent or neutral to items in a number of theme areas (Ascription of Responsibility, Knowledge and Locus of Control) that spoke to the sources or control of phosphorus in the lake (Item 4, 17 and 23) which was explained by the participant as irrelevant since the important issue is the result of that contribution and/or lack of control which is supported by the +2 ranking for item 10 ("Phosphorus comes from wastewater, lawn fertilizer, poultry litter and it's in nature itself. It's the "elevated" part that causes the problem").

This perspective ranked low in Sense of Place and Place Protective items, particularly in relation to the singular place dependence statement (Item 28: -3), and mostly rejected items related to extrinsic motivation for environmentally responsible behaviors, providing the lowest ranking of all factors for Item 32 ("Protecting my lake property value is a huge incentive for me to learn about ways to protect the lake water quality"). Regarding intrinsic motivational items, this perspective wholly rejects item 35 ("Learning how to be more environmentally friendly at the lake gives me a great sense of personal satisfaction") while giving the highest ranking between all the factors for Item 36 ("I find it really pleasurable acting as a steward and advocating for our natural resources") at a +1 which strongly supports the rationale for review and inclusion of this

perspective in this study since this factor's perspective is the only factor indicating advocacy as a motivational pathway for environmentally responsible behavior.

Demographic Questionnaire

The demographic questionnaire provided some interesting information concerning knowledge of currently identified best management practices, as well as level of knowledge and amount of information received regarding the water quality issue at Grand Lake.

Fifteen of the participants identified watershed pollution as the "most important environmental issue affecting Grand Lake water quality". However, the majority of those participants focused on either septic or sewer systems as well as marina and boat waste cleanouts which applies to fecal matter levels in surface water and potential groundwater contamination. There appears to be less understanding of the significance of elevated phosphorus levels and associated blue-green algal blooms. Two of the participants specifically identified a failure to enforce rules and regulations as the most important environmental issue.

Ten participants reported having received information regarding lake water quality issues in Grand Lake, including the participant defining factor three. Most of the participants reported the use of a septic system for their lake residence with ten participants reporting they do not perform any maintenance or annual leak detection on those systems.

Sixteen participants reported owning shoreline property with nine participants reporting they perform no lawn maintenance, stating that a lawn service provides for lawn maintenance. Post-sort interviews revealed that lawn service maintenance may be a regular feature for individuals in housing or condominium complexes on the shoreline, particularly for seasonal residents. As such, lawn services may be a previously unidentified stakeholder in the region and additional research should be conducted to assess the potential impact on the lake water quality and the willingness to employ best management practices to address the phosphorus-loading

issue. Additionally, those reporting they do perform lawn maintenance, only four reported using fertilizer as a part of their lawn maintenance program. In response to the question "have you heard of rain gardens?" only seven participants reported in the affirmative.

Summary

While the participant pool did not represent every possible demographic group in the Grand Lake Region, its focus on property owning individuals provides a previously undocumented record of viewpoints associated with this demographic group. Although highly homogeneous as to race, age and shoreline proximity, there is a full spectrum of educational levels and length of residence as well as fairly equal gender division. From this participant pool, which was purposive and relied on a "snowball" recruitment technique, four distinct viewpoints emerged regarding the water quality problem in Grand Lake. These viewpoints provide, at a minimum, a foundational answer to the first research question in this study: What attitudes and perceptions are taken for granted regarding the Grand Lake water quality issues and efforts to improve the watershed?

In summary, the four factors are: 1). Aware, Ready to Help, but Seeking Information, 2). Committed and Protective, but Unsure, 3). Detached, Independent and Unaffiliated with Lake Recreation, and 4). Highly Informed and Aware, Desiring Regulation. The majority of participants subscribed to the factor one viewpoint (13 participants) representing 38 percent of the study variance, while three participants comprised the factor two viewpoint. Factors three and four are highly limited viewpoints as they are comprised of only one participant for each factor and together represent only 10 percent of the study variance, but each was deemed necessary and appropriate to represent in this study based on their unique demographic profiles. Q-Method provides sufficient latitude to allow statistically insignificant or unstable factors to be represented

depending on the social and political context of their existence (Brown, 1980). Overall, the four factor solution represents 61 percent of the study variance after factor rotation.

Regarding the second research question, "What do the patterns of discourse reveal about motivation to participate in the desired behaviors for watershed improvement?", a number of distinct discourse patterns emerged providing insight into the pathways and the impediments to desired watershed protection behaviors. These patterns involved varying levels of knowledge and ascription of responsibility, as well as perceptions of personal locus of control. Motivation orientation was considered as a situational variable and the research rendered confirmatory, albeit predictable, results aligned with previous research (Kaplan, 2000).

Specifically, factor one discourse pattern supports the Hines, Hungerford and Tomera (1987) model for environmentally responsible behavior as this factor group appears highly amenable to adopting requisite environmentally protective behaviors if skill-based knowledge and skills training can be designed and provided to these individuals. The discourse pattern for factor two lends support for communication appeals and education approaches that represent Grand Lake as a unique geographic place that requires certain place protective measures in order to ensure that the area remains a special place for stakeholders subscribing to this viewpoint. This approach is supported by previous research (Stedman et al. 2007) that notes a significant correlation between place attachment and levels of satisfaction in motivating place protective behaviors.

Factors three and four have distinct perspectives. Although limited by their statistical instability (low Eigenvalues and amount of explained study variance), consideration of these perspectives is supported by their unique demographic profiles that were underrepresented in the current study and merit further future research..

CHAPTER V

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

This study endeavored to discover the knowledge, beliefs and attitudes of stakeholders in the Grand Lake watershed regarding lake water quality and potential motivational and educational bases for activating environmentally responsible behaviors that could reduce non-point source phosphorus pollution to the lake water reservoir. The impetus of this study has been the recent increase in blue-green algal blooms in the Grand Lake watershed which have been primarily attributed to extensive phosphorus-loading to the lake water from point and non-point sources in the watershed. Despite efforts to identify and address point and non-point sources, the water quality has continued to degrade over the course of the last decade imperiling the designated uses for Grand Lake (OCC, 2004). Starting in 2005, the Oklahoma Conservation Commission (OCC) implemented demonstration projects for non-point source pollution reduction around Grand Lake. In 2006, OCC started a voluntary, citizen-based implementation project in the Honey Creek Subwatershed. This project has resulted in widespread implementation of rural practices which have drastically reduced nutrient levels in Honey Creek. These results indicate that additional non-point source restoration projects could benefit the area (OCC, 2009).

Until recently, there have been too few citizen-based stakeholder groups providing input and volunteering to assist in the development and implementation of watershed improvement plans (GLWAF, 2008) As such, material improvements to the watershed water quality are being impeded and do not look promising for the next ten year. There is an urgent need for all

stakeholders in the Grand Lake Watershed basin to assume personal and collective responsibility for reducing nutrient-enriched non-point source pollution through behavioral practices and addressing phosphorus standards and limits in point source effluent based on issue knowledge and advocacy.

Study Context

Grand Lake is a unique lake within the boundaries of the State of Oklahoma. In 1935, the Oklahoma Legislature created the Grand River Dam Authority (GRDA) expressly to administer the use of the Grand (Neosho) River for both hydroelectric power development and flood-control (Holway, 1948). In 1939, The New York Times reported on the construction of the Pensacola Dam and the creation of Grand Lake O' the Cherokees referring to it as one of Oklahoma's "play spots" (Ross, 1939). Today, Grand Lake is one of only a few Oklahoma lakes that allow private ownership of waterfront, shoreline property which has encouraged residential shoreline development (OCC, 2004). As such, Grand Lake may, in general, be perceived as a utilitarian, man-made resource that provides for recreation and power production, as opposed to a significant natural resource with cultural, aesthetic, historical and ecological facets that should be protected for current and future generations' enjoyment and Oklahoma's environmental heritage.

It should be noted that both perspectives can be considered as essentially anthropogenic as each perspective frames the resource as beneficial to human needs either as an economic asset (i.e. area tourism and economic development) or for personal recreational purposes, each of which requires care and preservation of the water quality as an attractive element for current and future lake uses. Recognition of the predominant anthropocentric valuation in the watershed area provides that the attitudinal changes required for facilitating environmentally responsible behavior in the watershed area would not require a paradigmatic shift in worldviews

(anthropocentric to ecocentric), but instead a purposive reinterpretation of the Grand Lake watershed espousing the value of environmentally responsible behavior for human benefit.

Discussion of Findings

Four different factors, or perspectives, were discovered using Q-Method to analyze and interpret the study data in order to answer the first research question: "What attitudes and perceptions are taken for granted regarding the Grand Lake water quality issues and efforts to improve the watershed?" The four factors are: 1) Aware, Ready to Help, but Seeking Information, 2) Committed and Protective, but Unsure, 3) Detached, Independent and Unaffiliated with Lake Recreation, and 4) Highly Informed and Aware, Desiring Regulation. The majority of participants subscribed to the factor one viewpoint, while three participants comprised the factor two viewpoint. Factors three and four are highly limited viewpoints as they are comprised of only one participant for each factor and together represent only 10 percent of the study variance, but each was deemed necessary and appropriate to represent in this study based on their unique demographic profiles. Only one participant confounded between factors; however this individual leaned more strongly towards the factor two perspective.

Factor 1: Aware, Ready to Help, but Seeking Information

Individuals subscribing to this perspective had high levels of personal ascription of responsibility and generally held all contributors to the problems equally responsible for the problem and solution, expressing a social norm of collective responsibility in common pool resources. This factor aligns with the theoretical and empirical foundations of early models explaining Environmentally Responsible Behavior (e.g. Schwartz's Norm Activation Model (1977) and Stern et al.'s Value-Belief-Norm Model (1999) wherein a personal norm coupled with awareness of consequences for one's actions and ascription of responsibility predict prosocial intentions and behavior. However, as noted by a number of scholars and researchers (i.e. De

Young, 2000), early models are inherently linear in their explanation of human behavior which is too psychologically complex to reduce to simplistic and singular determinants. Specifically, early models fail to address personal utility and self-efficacy beliefs towards the requisite desired behavior (Wall, Devine-Wright & Mill, 2008).

Hines, Hungerford and Tomera's Model of Environmental Responsible Behavior (1987) provides that locus of control (self-efficacy) is an independent variable affecting one's predisposition towards intention to act, and that problem knowledge is insufficient to compel action in the absence of action strategies and skills associated with problem knowledge. The factor one discourse pattern supports the use of Hines, et al. (1987) model for environmentally responsible behavior as this factor group appears highly amenable to adopting requisite environmentally protective behaviors if skill-based knowledge and skills training is available and provided to these individuals who have a very high level of internal locus of control, moderate level of knowledge awareness, and high levels of ascription of responsibility, but an acknowledged lack of action strategies and skills.

The Hines et al. (1987) research noted that the combination of greater issue knowledge and action strategies had a positive correlation ($r=.299$) to environmentally responsible behavior and the combination of internal locus of control, personal ascription of responsibility and attitude provide the strongest correlates ($r>.30$) for environmentally responsible behavior. Also, considering that internal locus of control is central to most cognitive motivation theories (Schunk, 2008), the relatively high levels of perceived internal locus of control noted for the factor one perspective, strongly suggests that individuals and groups with this perspective would be the most receptive to information and education campaigns designed to increase problem awareness and provide action strategies and skills for reducing phosphorus pollution, and more prone to adopt those skills in everyday activities in the Grand Lake Watershed.

However, Bamberg and Moser (2007) assert that the internal attribution of responsibility in conjunction with a social or moral norm that produces feelings of guilt is a greater determinant of environmentally responsible behavior than problem awareness. Review and interpretation of data for factor one provides no evidence or suggestion that individuals subscribing to this perspective feel guilt in relation to violation of a social or moral norm associated with the phosphorus pollution issue. However, item statements were not selected that would provide representation of guilt feelings, so a determination of the existence and potential effect of guilt feelings cannot be made by this study's data, although the high level of rejection for item six suggests that those individuals subscribing to this viewpoint, perceive a social norm dictating that one must not assert individual benefit for land use in the watershed over the needs and welfare of the collective whole in the common pool.

The Hines et al. Model (1987) (See Figure 2) also makes provision for situational variables that can either facilitate or impede intention to act. Situational variables can consist of economic or infrastructure resources which did not emerge in this study as deterrents to action; however, one could also consider social amplification or attenuation of risk to the individual or society as a situational variable (Masuda and Garvin, 2006). While this study did not specifically address statements to assess risk perception, a few statements (Items 29, 12, and 11) could be interpreted as risk-based statements. Of the identified statements, factor one provided a relatively high ranking (+3) for item 29 ("Water quality issues don't just threaten the environment here at Grand Lake, but also the unique culture and recreation of this place."), indicating some perception of risk associated with the unchecked degradation of water quality.

Masuda and Garvin (2006) noted in their research that attenuation or amplification of risk associated with place was affected by residential status, with residents more likely to amplify risk. While this study did not seek to define residential status as a demographic variable, post-sort interviews indicate that a number of the participants associated with the factor one perspective are

seasonal, recreational residents; therefore, they may be more inclined to attenuate risk related to tourism and lake recreation (Item 11 "If the lake water quality gets much worse, people will quit coming to the lake because it'll be too unhealthy to get in the water" and Item 12 "We need to protect the water quality of the lake in order to keep tourism dollars coming into the community"), while still acknowledging the existence of risk (Item 29). If this group attenuates the risk to lake recreational pursuits from eutrophic lake conditions, that attenuation could impede adoption of requisite behaviors.

Interestingly, a number of individuals subscribing to factor one perspective in this study report participating in group meetings regarding lake water quality issues, in particular their homeowner association meeting with state and GRDA officials; however, during post-sort interviews, it was explained that these meetings were in relation to a groundwater contamination issue due to a leaking septic system. This situation, a contaminated drinking water well, sickened a number of the residents in the condominium area, and ultimately resulted in permanent well closure, along with a number of legal actions and hurdles to address the need for a safe drinking water source and a functioning, compliant wastewater treatment system.

This episode has perhaps resulted in a social amplification of risk in regards to water quality issues for affected stakeholders in the Grand lake watershed, although the lake surface water quality issue—phosphorus-loading from point and non-point runoff sources—is significantly different than the issue of fecal bacterial contamination of a groundwater drinking water source. Granted, leaking septic systems are considered one of the many sources contributing to the degraded lake water quality by allowing phosphate containing household waste water into the reservoir, but estimates of their contribution levels to the surface water degradation have been low to fairly inconclusive (Burgess, K. 2005); yet, nine of the 13 participants defining factor one's perspective noted in the questionnaire that "septic", "wastewater", or "sewers" were the most important environmental issue affecting Grand Lake

water quality. The importance of this finding is the lack of distinction between groundwater and surface water in some stakeholders' perceptions when discussing water quality issues at Grand Lake which could result in inattention to important nonpoint source runoff projects and solutions as individuals do not make see the connection between runoff pollution and what they have cognitively constructed as the cause of the surface water degradation from experience with groundwater contamination.

Factor 2: Committed and Protective, but Unsure

Factor two is highly correlated (0.5462) with Factor one (See Table 3) and as such, one can view factor two as an alternative perspective for factor one, or consider it as a separate factor with high levels of interconnectedness with factor one. The primary difference between this factor and factor one is in regards to Sense of Place. Study participants subscribing to this viewpoint should perhaps be referred to as the "Grand Lake Lovers"; they have a pronounced Sense of Place, demonstrating high levels of place attachment, identity and dependence identified by the ranked order of the statements in their Q-sorts, which appears to manifest in place protection attitudes based on analysis of the participants' data. This factor's viewpoint is consistent with Sense of Place theory constructs and place protection theory (i.e. Relph, 1976; Tuan, 1974, Low & Altman, 1992; Williams &Patterson, 1996) which posits that through activity based experiences in the physical place, along with human psychosocial interactions, individuals develop a sense of belonging and attachment to the place, finally resulting in a commitment to the place (Relph, 1976: Shamai, 1991). Research has demonstrated (e.g. Manzo, 2005; Schultz, 2000, Stedman, 2002; Vaske & Korbin, 2001) that individuals with strong positive attitudes toward an attitude object (i.e. a geographical place), will generally engage in protective behavior towards that object. However, the people-place connection, much like the human-environment connection, is complex and cannot be explained by reduction to a singular, linear path. Research has noted that low satisfaction levels may be an impetus towards place protective behaviors in individuals

with strong place attachment (Stedman, 2002), while alternately, individuals "have the capacity to be attached to settings perceived as environmentally degraded" (Stedman, et al. 2007, p. 344), yet empirical support exists for the hypothesis that individuals and groups that feel a greater level of attachment to their local environment will exhibit more environmentally responsible behavior (Vaske & Kobrin, 2001; Scannell & Gifford, 2010). As this study did not look at levels of satisfaction among participants' use and experience with the Grand Lake area, or ask about one's willingness to participate in environmentally responsible behaviors, future research should be conducted to assess the people-place connection at Grand Lake in light of this study's findings of its existence.

Factor 3: Detached, Independent and Unaffiliated with Lake Recreation.

Principal to this factor's perspective is primary attribution of the problem to upstream or "other" sources and a strong landowner-rights belief. Furthermore, this perspective may have a lower level of knowledge accuracy than other factors, while rejecting intrinsic motivation bases for environmentally responsible behavior. As previously discussed, this factor is highly limited by a singular participant load which leaves the factor statistically unstable, along with a low Eigenvalue and percent of study variance; however, correlation with the other three factors is extremely low (See Table 3) and the demographic questionnaire suggest a unique demographic profile that may be an essential viewpoint that could be investigated in future research.

To begin to understand this factor, it is best to remember that environmental concern is usually measured in relation to other concerns in context to one's perception of the importance of environmental quality and the value one assigns to that perception in relation to other competing concerns (Klineberg, et al., 1998). Additionally, people differ in the quality and quantity of resources available to them for dealing with competing concerns, so issue salience is often the defining criteria that garners the attention and resources available to the individual (Bosso &

Gruber, 2006); Klineberg, et al.,1998). Factor three does not appear to assign a great level of salience to the water quality issue as evidenced by the rejection of the idea that water quality issues will result in lower tourism rates in the area; in fact, it appears that tourism-related impacts on the Grand Lake area are more salient than the water quality issue as expressed in the concern that water quality issues could affect the tourism-based economy (Item 12: +3) and the demographic questionnaire statement "I see the problem is in how people treat the environment when they come to visit. They don't live there and they abuse it". However, it is difficult to confirm this interpretation as efforts to contact the sole individual loading on this factor were unsuccessful.

A material and limiting concern in understanding this factor's perspective of the water quality issue regards the lack of statements in the Q-sample addressing tourism-related development impacts on the area or associated water quality; statements only addressed the impact of water quality issues on tourism. It is highly appropriate to understanding this factor's viewpoint to note that Klineberg et al. (1998) analysis of four biennial Texas-wide surveys noted that "determinants of environmental concern vary greatly depending on the wording and framing of the questionnaire items." (p. 749).

This perspective's high level of value placed on private landowner rights (Item 6: +4) and overall acceptance of water contaminants (i.e. animal and human waste, chemicals) suggests a strong anthropocentric viewpoint which values the environment from a utilitarian, human exceptionalism perspective which is aligned with the dominant social paradigm referred to in Dunlap and Van Liere's (1978) study that noted the emergence of the New Environmental Paradigm. Factor three's perspective seems to provide for stewardship and protection of land to the extent of its value and use to the owner, and regards private property as unconnected to the environment as a whole, or as part of a common pool resource. This particular perspective, while perhaps underrepresented by the participant pool in this study, is not unique in regards to the

human relationship with land. As Aldo Leopold (1948) so aptly explained, an object regarded as property or a possession provides for a relationship where all privileges of the relationship flow to the owner, with no obligation towards the object's well being beyond preservation of value to the owner. Land is not viewed as a member of a biotic community, connected and essential to the health of the biotic community, but as a possession, wholly amenable to conquest and separation for mankind's use. The study data provides peripheral support of this assertion in relation to this factor through the high ranking of protecting one's property value as motivation for protecting lake water quality (Item 32: +4) and the community economy (Item 12: +3). This is the essence of an anthropocentric worldview where an ethical or moral standard for behavior is only applied to humans.

While few studies have examined the implications of anthropocentrism on ecological dilemmas, Kortenkamp and Moore's (2001) exploratory study examining moral reasoning in regards to environmental dilemmas found that moral reasoning regarding ecological dilemmas is strongly impacted by available information on ecological impacts. While it did not necessarily create a paradigmatic shift in ethical position (anthropocentric vs. ecocentric), the inclusion of information created more issue salience and elicited more consideration of an individual's personal actions.

Additionally, Kortenkamp and Moore's (2001) study noted a difference in moral reasoning when a land-use conflict arose on pristine land versus degraded land. Results indicated that pristine land conflicts created more focus on the damaging effects on the land than on land already regarded as degraded or in human use. Considering the relatively low level of issue awareness exhibited by factor three's ranking of knowledge-related items, and the historical, anthropocentric-driven purpose of Grand Lake's creation, Kortenkamp and Moore's (2001) findings could be material to heightening issue salience for this factor group, as well as providing a communication path for eliciting the establishment of lake protective behaviors and social

norms by addressing the lake water quality issue from an anthropocentric viewpoint. Kaplan (2000) also provides that often humans may view an issue as more salient, and respond behaviorally, if it can be approached from an anthropocentric ethical position that accounts for human self-interest (as opposed to altruism) as a personal norm.

Other considerations for communication and awareness campaigns targeted to a factor three perspective involve activating attention. Schultz and Zelezny (2003) assert that most individuals want the government to do something to address the problem, but only on "others" (i.e. business and industry) and only on those issues seen as posing a risk to the individual, thus attention is activated and directed to only those items that are assessed as relevant and/or interesting to the individual for further cognitive processing (Schunk, 2008 referencing Broadbent's 1958 filter theory). Factor three's high ranking (+3) of item 15 ("The only reason water quality is an issue is because the media is making it an issue") and item 17 ("We know that there's urine and chemicals and chicken and cow poop in the lake; that's normal and it's in every lake") strongly suggests that this perspective has not assessed the water quality issue in a personal risk framework that would activate attention. Thus, water quality, in the context of human and environmental health, may not be salient to this perspective. This would further support the assertion that this perspective views tourism-related impacts to the area and the individual as the more salient issue than lake water quality, thus attention has not been activated. Additionally, the high ranking of individual landowner rights and neutral to general support of items related to government regulation and control, suggest support for Schultz and Zelezny's (2003) contention regarding individual response to environmental concern and responsible behavior, wherein control of the problem and solution shifts to an external locus of control such as the government or industry and the individual has no accountability to react and engage in the issue.

However, as we've noted, individuals are highly complex in their decisions to act on personal and social norms in the context of daily life and assessment of the issue; therefore, this

factor may present the most difficult challenge for education and communication campaigns to effect behavioral change in regards to protecting lake water quality or eliciting participating in stakeholder groups for developing and implementing CWA 319 watershed improvement programs.

.Factor 4: Highly Informed and Aware, Desiring Regulation.

Factor four's perspective is interesting as it reveals a perspective that assumes that in the absence of socially sanctioned punishments, there is little prospect of problem solution. This perspective is similar to Ajzen's (1991) Theory of Planned Behavior wherein requisite behavior is contingent upon a rational assessment of behavioral consequences in the context of self-efficacy to perform the requisite behavior and the social norms surrounding the requisite action. Bamberg and Moser (2007) incorporated this behavioral theory within their predictive model as a motivational pathway originating from problem awareness and proceeding to social norms wherein an interaction with independent variables of locus of control (PBC), attitude and moral norms impact intention to act (See Figure 3). If one considers a legal restraint or requirement as the formal memorialization or codification of a social norm in a democratic society, then this pathway might be the most predictive of environmentally responsible behavior. Bamberg and Moser's (2007) meta-analysis attributed an average of 52% of variance on intention to act to the intercorrelation of locus of control, attitude and moral norm. This study also determined that social norm is directly associated with locus of control (PBC) attitude. Additionally, Bamberg and Moser's (2007) study provided support that environmentally responsible behavior is often a combination of pro-social (e.g. social norms) and self-interested (e.g. attitude, feelings of guilt) motivations, although the case can be made that even pro-social motivations can be an expression of self-interest in the avoidance of social ostracizing. As such, Bamberg and Moser (2007) propose that in any decision or intention to act in an environmentally responsible manner is "a weighted balance of information concerning three questions, 'How many positive/negative

personal consequence would result from choosing this pro-environmental option compared to other options?', 'How difficult would be the performance of the pro-environmental option compared to other options?', and 'Are there reasons indicating a moral obligation for performing the pro-environmental option?'" (p. 21). This line of reasoning also follows Klineberg et al.'s (1998) assertions that all environmental concern is an exercise in tradeoffs between competing interests and concerns.

Factor four's perspective appears to accept the need for formally-imposed, and legally enforceable positive and negative consequences to balance the lack of a moral obligation and informal social norms for environmentally responsible behavior on the part of the upstream polluter towards downstream residents and lake visitors. Unfortunately, despite accounting for over half of the study variance, the combination of social norms, moral norms, locus of control, and attitude can only predict on average 27% of the behavior variance in the study (Bamberg & Moser, 2007).

One predominate issue with a command and control approach to environmentally responsible behaviors is the need for resources to both implement and enforce. This may not be a feasible option for a multi-jurisdictional commons dilemma due to issues with costs and accountability for enforcement. Additionally, command and control approaches can introduce levels of compliance complexity that over time can become contradictory and this approach provides no remedy for the existing condition, except for natural attenuation in the absence of further pollution inputs. Command and control approaches are also highly amenable to industrial point-source inputs, but generally ineffective for non-point source pollution which has been determined to be a significant contributor to the phosphorus-loading issue.

However, in the absence of efforts towards regulation of pollution sources in the watershed, those subscribing to the factor four perspective appear to be unmotivated to engage in

environmentally responsible behavior beyond the normal socially-accepted requisite standard; therefore, those subscribing to this perspective may reject appeals towards voluntary residential control of non-point source pollution or infrastructure changes for private wastewater management since there is no enforceability within the commons dictating compliance with the request. This perspective may also impact other perspectives if those groups and individuals identify those in factor four as subject matter experts. This can be either beneficial or detrimental depending on the position of the factor four perspectives' attitude towards the problem solution. This perspective could be considered an influencing perspective if all that subscribe to it are considered to be community leaders or experts on the subject, but as previously noted, this perspective is currently highly limited due to the existence of a single load. Further research needs to be conducted on the attitudes and perspectives of identified community leaders and subject matter experts to assess the fully impact of this perspective.

Motivational Bases

As a part of assessing the existing motivational bases for behavior, six statements relating to intrinsic and extrinsic motivation were embedded in the Q-sample. Each of the three statements (items 31, 32 and 33) relating to extrinsic motivation achieved designation as a distinguishing statement in three of the four factors. Item 31 ("I'd like to replace my septic system but I need the state to pay for it or give me a tax write-off") was a more divisive statement than items 32 and 33, with only factor two ranking it as a positive category item (+3) while item 32 ("Protecting my lake property is a huge incentive for me to learn about ways to protect the lake water quality") provided more overall consensus with high rankings (+3 and +4) for three of four factors and a neutral ranking on factor four, although this was a distinguishing statement for factor four. Alternately, intrinsic motivation statements (items 34, 35 and 36), were generally ranked low or neutral, and only one statement (item 36) was identified as a distinguishing statement for factor three which wholly rejected the statement (-4). These results are not surprising and may be highly

correlated to the context of the geographical area which is regarded as a recreational area for second-homeowner individuals and investment property owners.

As previously discussed, a number of researchers (e.g. Herberlein, 1972; Schwartz, 1977; Stern et al., 1999) have confirmed that norms (personal and social) have a determinant effect on environmentally responsible behavior. However, activation of these norms has been a focus of continuing study and debate for researchers. In general, research has explored the effect on social norm activation elicited by either direct observation of another's behavior in a situation or by focusing attention on what others should do or would expect one to do in a specific situation. Krupka and Weber (2009) found strong support that both processes elicit pro-social behavior even in the presence of observed selfish or anti-social behavior. Personal norms are much more difficult to study in relation to social dilemmas, but research indicates that these norms are activated in relation to "conventional decency and thoughtfulness" through values such as being responsible, helpful, or those values related to social justice and equity (Biel & Thøgersen, 2007, p.102).

Overall, motivation to conform to requisite social behavior through activation of norms appears to lie in the concept of norm reinforcement through intrinsic or extrinsic rewards and/or punishments to the individual. While an extrinsic reward or punishment (e.g. a cash back rebate program, financial penalties) is initiated and derived from external sources, an intrinsic reward is one initiated and derived solely by the individual and is usually a form of personal internal pleasure or satisfaction with one's actions (Biel & Thøgersen, 2007; De Young, 2000), Previous research (e.g. Schultz & Zelezny, 2003; De Young, 2000; Kaplan, 2000) has identified a propensity towards an extrinsic motivational base due to the proliferation of human self-interest in society. De Young (2000) explains that previous research has provided ample support that extrinsic motivation devices (contingent rewards) applied in the tradition of behaviorist condition may initiate environmentally responsible behavior, but has demonstrated a pronounced inability

to maintain persistence in resultant behavior changes through these devices. Additionally, a phenomena referred to as "motivation crowding" provides that extrinsic motivation devices often create a dampening effect on intrinsic motivation for adoption of requisite behavior (see Bėnabou & Tirole, 2003, 2006; d'Adda, 2011). In order to sustain motivation for new behavior patterns, intrinsic motivation (which is associated with a greater level of cognitive processing and integration) must be accessed or instilled in individuals in relation to their social and personal norms.

Kohlberg's 1984 theory emphasizes individual cognitive construction of moral meaning and assigns developmental levels to moral development; an individual at the lower developmental levels will respond more to extrinsic motivations to conform to moral standards (personal and social), while those in higher, mature levels will display greater intrinsic motivation in conforming with norms (Gibbs, 1991). Referencing Kohlberg and his levels of moral development, Baxter and Rarick (1987) state that studies support that most individuals only reach a level of conventional morality abiding by established laws and seeking social approval by conforming to social norms. In order to reach the highest level (Level III), an individual must possess the ability for abstract thinking and perform an internal cognitive reorganization in the face of dilemma contexts. Unfortunately, current educational processes employ fragmentation of information from early childhood education and onward, which is counterproductive to training individuals to attain a "world view of life as a totality" in formulating values and personal norms (Baxter & Rarick, 1987p. 245). However, De Young (2000) suggests that a shortcut towards accessing intrinsic motivation lies in the concept of competence. Noting evidence (De Young, 1988-89 and Corral-Verdugo, 1997) that competence was more predictive of observed environmentally responsible behavior than self-reported values and beliefs, De Young (2000) suggests that intrinsic satisfaction with one's competence in performing a requisite behavior may

allow that environmentally responsible behavior to become internalized to a personal norm through intrinsic reinforcement.

In the context of this study, development of and demonstration of requisite behaviors that can be easily performed along with communication of the pro-social and environmental impacts of adopting the requisite behavior may be a pathway towards accessing intrinsic satisfaction in targeted populations. With sufficient time and appropriate feedback, the intrinsic satisfaction may result in an internalized norm that is durable and meets the goal of encouraging further participation in stakeholder efforts for watershed management goals. This current study's data suggests that this tactic has potential due to the very high levels of expressed internal locus of control for the majority of participants (see Factor 1) in addressing the lake water quality issue. An alternative or complementary approach to encourage participation in watershed protective behaviors might take advantage of Krupa and Weber's (2009) use of focusing and social observation to elicit pro-social behavior. Drawing from theories on focus and spreading activation in educational psychology, pro-social behavior may result from providing greater distribution of demonstration projects in the watershed that allow for direct observation of expected requisite behavior in a social context.

Implications for Practice

The purpose of this study was to discover and explore perceptions of the water quality issue on Grand Lake associated with increasing phosphorus levels in lake water leading to prolific and serious blue-green algal blooms. Understanding stakeholder perceptions is essential to developing and implementing Environmental Protection Agency (EPA) Clean Water Act's 319 watershed management plans for water quality improvement which only allows for voluntary best management practices (BMPs); there are no enforcement provisions to this program.

This study has revealed four different perspectives regarding the water quality issue at Grand Lake as a combination of knowledge levels, personal ascription of responsibility, locus of control beliefs and motivational bases for adopting best management practices as a part of a watershed management plan. Evident in this study's results, people construct their own truth or understanding of an environmental problem by connecting prior or current personal experience and knowledge with new information creating unique perspectives that function to define both the problem and the individual's role in the problem resolution (Bosso & Gruber, 2006; Dake, 1992; Freudenburg, 1991; Klineberg, et al., 1998; Lowe & Pinhey, 1982; Merriam, Caffarella, & Baumgartner, 2007;Michael, 2006; Tremblay & Dunlap, 1978; Schunk, 2008). This wholly human phenomenon presents a challenge to groups and individuals seeking solutions to environmental problems. Unfortunately, problems involving multiple jurisdictions and stakeholder interests are not amenable to solutions that remove the human element; therefore, a deliberative process must be employed to understand the perspectives of affected stakeholders (Focht, 2004).

The perspectives revealed in this study, while each is unique, provide for a few overarching themes that may provide for more stakeholder interest and participation in the Grand Lake watershed management plan. First, education regarding sources of phosphorus in the watershed and the impact of elevated phosphorus levels in the lake water is necessary, as well as a differentiation between the fecal contamination issue of septic systems and their contributions to phosphorus-loading in the surface water. The Hines, Hungerford and Tomera (1987) model advocates for an education campaign that provides not only information, but skills knowledge. There have been a number of demonstration projects in the Grand Lake Watershed (i.e., Honey Creek demonstration farm, rain gardens in multiple locations in the City of Grove); however, there may need to be a wider dissemination of these projects to shoreline residents and recreation communities. Secondly, there is a strong interest in local resolution through enactment of

personal behaviors that are deemed effective in resolving the issue; however, efforts could be made to demonstrate that locus of control does not have to refer only to direct cause and effect behaviors (e.g. reducing phosphate use), but is also applicable to political voice to drive policy-based resolutions for upstream source contributions (Focht, 2004).

Lastly, extrinsic motivation might provide a springboard opportunity to gain immediate stakeholder attention and involvement. Kaplan (2000) argues that for efficiency sake, acceptance of the reality of human self-interest may be the most effective approach for motivating environmentally responsible behavior in the short term; however, education and communication programs must be developed to encourage development of intrinsic motivation for any durable changes to watershed stakeholder behavior. In the context of the Grand Lake watershed area, extrinsic motivation devices should focus more on gaining willingness to implement infrastructure best management practices (e.g. new water treatment facilities, shoreline erosion control, or reduction of septic systems).

Recommendations for Further Research

The findings from this study provide a foundation for other research questions in regards to environmental problems in common pool resources, place theory implications for environmental problems, and motivational and antecedent pathways for environmentally responsible behavior. Recommendations include:

1. Replication of this study with a focus on greater demographic diversity in the participant pool in order to assess the existence of additional perspectives, and confirmation of the revealed perspectives in this study.
2. Examination of the effectiveness of education and information campaigns specifically focused on any or all of the four perspectives revealed in this study.

3. Exploration of the impact of participant political affiliation on preference for local regulation versus federal regulation of the watershed problem resolution.
4. Exploration of a potential conflict perspective regarding tourism-related development in the Grand Lake watershed as impacting water quality as opposed to water quality impacting tourism-related development.
5. Examination of potential confusion between groundwater and surface water pollution issues in relation to the Grand Lake watershed and exploration of stakeholder perceptions of human health and environmental risk.
6. Replication of this study with local, state, federal and tribal officials involved in the CWA 319 watershed and lake management planning.

Concluding Comments

As revealed in this study, there are a number of unique and interesting perspectives regarding the Grand Lake watershed pollution issue that may be in conflict with previous assumptions regarding knowledge levels and ascription of responsibility. Additionally, the majority of participants communicated a general affinity with the Grand Lake area which provides a platform to build interest and concern for the environmental health of the region. Still, focused, directed education and information campaigns need to be developed to provide accurate information regarding the phosphorus-loading issue and its environmental impacts, as well as connecting behavior patterns to the pollution issue (i.e. utilizing phosphorus in fertilizer for lawn maintenance). Demonstration projects need to expand to shoreline residential areas, particularly in regards to private wastewater treatment systems.

Additionally, it is my hope that this study will provide insight into environmental issues in other Oklahoma lakes considering shoreline development or increased tourism-related development. While technical and engineering controls for wastewater treatment and septic

systems can be mandated to protect lake water from contamination, human behavior in relation to an unfamiliar ecosystem needs to be addressed through education. One participant expressed quite adamantly that she felt she did not really understand what was required to protect the environment from pollution in a rural setting since it is so different than urban settings that have stormwater systems, trash service and wastewater treatment facilities. Recreational visitors and seasonal residents may have little understanding of the connectedness of rural ecosystem services including filtration of non-point source stormwater runoff and vegetative erosion control.

Ultimately, my final recommendation is that overarching messages, in the vein of Rachel Carson and John Muir, should be developed to initiate a process of moral consideration and valuation of the Grand Lake area as a valuable natural resource that is an essential Oklahoma legacy which requires care and respect in order to ensure it is available for future generations. The Grand Lake area has a rich cultural and historical past that has been obscured by its designation as a recreational asset. Through historical and cultural interpretation of this natural resource area, support for programs to regulate and protect this ecosystem may arise and lend greater stakeholder participation in the development and implementation of a watershed improvement plan.

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APPENDICES

Appendix A

IRB Approval

Attachment A

Research Study
Grand Lake Watershed Stakeholders
2012

Our research team is investigating the perceptions from Grand Lake Watershed stakeholders of lake water quality issues in the Grand Lake O' the Cherokees. We would like to invite you to participate in our research study which will require about 30 minutes of your time. You will be asked to read several statements and sort them according to how they reflect your opinions.

To Sign Up for the Study contact:
Teri Holmes: teri.holmes@okstate.edu: (918) 606-2916

Consistent with previous research in this area, we will request your permission to find out descriptors of demographic information (e.g. age, gender, education level, etc.). No names will be given or used in any way. The information you submit can only be accessed by the researcher and will remain private. All data collected in this study will remain strictly confidential and only group results will be reported. Risks associated with participating in this study are minimal.

Questions?

Teri Holmes: teri.holmes@okstate.edu : (918) 606-2916
Dr. Lowell Caneday: lowell.caneday@okstate.edu: (405) 744-5503

Appendix B

Information about the Study

INFORMATION ABOUT STUDY

Project Title: EXPLORATION OF ANTECEDENTS OF ENVIRONMENTALLY RESPONSIBLE BEHAVIOR BY STAKEHOLDERS IN GRAND LAKE WATERSHED

Investigators: Teri Holmes, Doctoral Candidate at Oklahoma State University and Dr. Lowell Caneday, Ph.D., Regents Professor, Oklahoma State University.

Purpose: The purpose of this study is to discern the perceptions of Grand Lake Watershed stakeholders to water quality issues in the watershed in relation to known antecedents of environmentally responsible behavior in order to develop effective outreach education programs as required in the Clean Water Act 319 watershed management program.

Procedures: You will be asked to complete a Q-sort which involves reading several statements and sorting them into categories based on the extent to which the statements reflect your opinions. You will then be asked to record your results on a Record Sheet and to complete a short survey that has demographic questions about you. The session should last about 30 minutes. If you choose to provide a first name or code name and phone number, you may be called to discuss study results from your perspective. The call will last about ten minutes.

Risks of Participation: There are no known risks associated with this project which are greater than those ordinarily encountered in daily life.

Benefits: Results from this research may be used to provide a better understanding of Grand Lake Watershed stakeholders' perceptions of water quality issues which could facilitate effective education outreach programs or policy interventions. These findings could have implications for dealing with ecological commons dilemmas associated with natural resources utilized for recreational purposes.

Confidentiality: You are not asked to provide a signed copy of this form so that no names are collected from you, thereby reducing your risk in participation. Please keep a copy. Your responses to both the sort and the survey are confidential. No names or other identifying information will be attached to your packet and only aggregate data will be reported. The data will be securely stored in a locked file cabinet in one researcher office. The paper copies will be destroyed one year after the completion of the study. Only the researchers will have access to the information that is stored electronically without any identifying information and it will be destroyed five years from completion of the study.

The OSU IRB has the authority to inspect records and data files to assure compliance with approved procedures.

Contacts: If you have questions or concerns about this research project, please feel free to contact the researcher's listed below:

Dr. Lowell Caneday, 184 Colvin Center, Stillwater, (405) 744-5503; lowell.caneday@okstate.edu
Teri Holmes, 7722 S. 73rd E Ave, Tulsa (918) 606-2916; teri.holmes@okstate.edu

If you have questions about your rights as a research volunteer, you may contact the Oklahoma State University Institutional Review Board (IRB) Chair, Dr. Sheila Kennison at 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu or irb@okstate.edu.

Okla. State Univ.
IRB
Approved 5/9/02
Expires 5/8/03
IRB # ED-02-83

Appendix C

Q-set with Category Labels

	Statement	Category
1	Oklahoma can't blame other states for the problem until we get our act together setting a maximum amount of nutrient allowed in the water.	Ascription of Responsibility
2	We, the Grand Lakers, have done a "reasonable job of acting like an Ostrich with our heads in the sand.	
3	We all need to get educated about the issue and learn what to do to help the situation since we use this lake.	
4	I think every person who's on this lake has made some contribution to the problem since phosphorus is in everything--fertilizer, soap, the soil--you name it.	
5	The chicken processing plants and farmers spreading chicken poop on the fields in the watersheds of our Oklahoma lakes is the culprit for the green algae.	Ascription of Responsibility
6	It's our land; I guess we have the right to do what we want to with it regardless of water quality.	
7	If the state wants to fix this problem, they need to do their job and inspect septics or pay to hook up city sewer systems on the lake.	
8	The pollution all originates upstream of Grand Lake so why should I be required to do something?	
9	Kansas is turning Grand lake into a toilet bowl; the EPA is responsible for fixing this, not us.	
10	Phosphorus comes from wastewater, lawn fertilizer, poultry litter and it's in nature itself. It's the "elevated" part that causes the problem.	Knowledge
11	If the lake water quality gets much worse, people will quit coming to the lake because it'll be too unhealthy to get in the water.	
12	We need to protect the water quality of the lake in order to keep tourism dollars coming into the community.	
13	We need to reduce use of products with phosphates, like less fertilizers and different detergents that can make a difference.	
14	Funding will be required to initiate upstream projects to reduce agricultural and commercial contributions to the nutrient loading of Grand Lake.	
15	The only reason water quality is an issue is because the media is making it an issue.	Knowledge
16	I think it's just the weather; it's happening in all the lakes because they naturally have phosphorus.	
17	We know that there's urine and chemicals and chicken and cow poop in the lake; that's normal, and it's in every lake.	
18	Since Blue Green Algae eats the phosphorus, when a bloom cycle ends, it has had a positive effect on the water quality.	
19	The government's the only one who can take some action to fix the water quality.	Locus of Control
20	Until the state spends the money to do inspections and make rules, the lake will continue to degrade.	
21	Humans can't really affect the environment because it's beyond our control.	

	Statement	Category
22	A lake management plan is worthless without regulations to enforce it.	
23	The leaky septic systems, bad city and town sewer systems, the use of chicken litter as a fertilizer to the industrial polluter can be controlled and make a difference.	Locus of Control
24	This problem is fixable if we follow the guidelines for reducing phosphorus; we can make a difference.	
25	Truth be told, everyone in this watershed can do something to help fix the problem.	
26	I consider myself a Grand Laker.	Sense of Place
27	Grand Lake is a special community that I like being a part of; it feels so much like a hometown.	
28	I tried other lakes, but none of them seemed to meet my recreation needs like Grand Lake.	
29	Water quality issues don't just threaten the environment here at Grand Lake, but also the unique culture and recreation of this place.	Place Protection
30	I'm really concerned about Grand Lake's future and feel I need to do something to preserve it.	
31	I'd like to replace my septic system but I need the state to pay for it or give me a tax write-off.	Motivations
32	Protecting my lake property value is a huge incentive for me to learn about ways to protect the lake water quality.	
33	If it were cheaper to use phosphate-free products, that would motivate me.	
34	The enjoyment I get from setting an example for my friends and neighbors motivates me to take action to protect the lake.	
35	Learning how to be more environmentally friendly at the lake gives me a great sense of personal satisfaction.	
36	I find it really pleasurable acting as a steward and advocating for our natural environment.	

Appendix D

Demographics Questionnaire

Demographic/Information Survey

1. Gender (check one): _____Female _____Male

2. Age Range (check one): 18-29____ 30-39____ 40-49____ 50-59____ 60+_____

3. Please check the item that best describes your race. Check all that apply.
   _____Black _____Native American _____Caucasian Asian_____
   _____Other, please specify: _____

4. What is the highest degree that you have completed (check one)?
   _____High School Diploma _____Associate's Degree
   _____Bachelor's Degree _____Master's Degree
   _____Doctorate Degree _____Other, please specify: _____

5. Are you retired? _____ yes _____ no

6. How long have you owned property in the Grand Lake area?_____

7. Is the property located along the shoreline of Grand Lake? _____ yes _____ no

8. Have you participated in any groups or meetings regarding the lake water quality issues? ___ yes ____ no

   If yes, please list the name of the group or the meeting(s) attended._____

_____

9. Do you perform lawn maintenance on your property in the Grand Lake Area?____ yes ____ no
   If yes, do you use fertilizer? _____ yes _____ no

10. Is your lake residence on a septic system? _____ yes _____ no
    If yes, do you perform annual inspections, testing or maintenance to detect leaking? ____ yes _____no

11. What recreational activities do you pursue while visiting Grand Lake?

_____ Boating/Jet-skiing/wave runners _____ Golfing
_____ Swimming _____ Sailing
_____ Cookouts with Family/Friends _____ Water skiing, Wakeboarding, Tubing
_____ Fishing _____ Other, please specify_____

12. Have you heard of rain gardens? _____ Yes _____ No

13. Have you received information regarding the lake water quality issues in Grand Lake? _____Yes _____No

14. Have you considered environmental impacts to the lake from lake residents and visitors?_____Yes _____No

15. What do you think is the most important environmental issue affecting Grand Lake water quality?_____

_____

16. What else would you like to say about the ideas on the statements you sorted?

A follow-up phone interview may be conducted to clarify results. If you would be willing to participate in a phone interview please write your first name (or a code name that you will know) and a telephone number at which you can be reached.

(CODE) NAME _____ PHONE _____

Appendix E

Correlation Matrix

PQMethod 2.11

Path and Project Name: C:\PQMETHOD/Projects/grdlkstd

Sept 03 12

Correlation Matrix Between Sorts

Sorts	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	100	51	72	61	39	53	75	61	16	42	61	47	63	60	65	69	56	-14	66
2	51	100	56	48	44	45	53	44	29	45	37	47	38	37	52	46	28	-31	46
3	72	56	100	65	52	66	67	61	9	43	54	65	46	54	72	57	46	-22	54
4	61	48	65	100	23	63	67	65	30	18	53	47	57	51	65	60	24	-19	42
5	39	44	52	23	100	51	35	35	-10	70	12	48	48	48	29	42	58	13	61
6	53	45	66	63	51	100	66	61	16	35	44	67	53	61	58	68	26	-12	54
7	75	53	67	67	35	66	100	50	28	38	46	45	54	58	70	53	34	-30	48
61	61	44	61	65	35	61	50	100	24	27	69	52	60	53	56	73	45	-4	65
9	16	29	9	30	-10	16	28	24	100	-17	19	8	1	12	4	-2	-7	-20	4
10	42	45	43	18	70	35	38	27	-17	100	7	21	51	42	39	38	38	4	65
11	61	37	54	53	12	44	46	69	19	7	100	45	38	38	58	51	31	-5	49
12	47	47	65	47	48	67	45	52	8	21	45	100	43	44	46	39	41	-19	52
13	63	38	46	57	48	53	54	60	2	51	38	43	100	62	55	60	40	37	74
14	60	37	54	51	48	61	58	63	23	42	38	44	62	100	39	44	51	7	61
15	65	52	72	65	29	58	70	56	4	39	58	43	55	39	100	65	21	-8	49
16	69	46	57	60	42	63	53	73	-2	38	51	39	60	44	65	100	39	2	56
17	56	28	46	24	58	29	34	45	-7	38	31	41	40	51	21	39	100	-4	53
18	-14	-31	-22	-19	13	-12	-30	-4	-20	4	-5	-19	37	7	-8	2	-4	100	12
19	66	46	54	42	61	54	48	65	-4	65	49	52	74	61	49	56	53	12	100

Appendix F

Communality Matrix

PQMethod 2.11

Path and Project Name: C:\PQMETHOD/Projects/grdlkstd

Sept 03 12

Cumulative Communalities Matrix –Unrotated Centroids 1 through 5

Sorts/Centroids	1	2	3*	4	5
1	0.7190	0.7191	0.7191	0.7216	0.7505
2	0.4452	0.4703	0.4709	0.5279	0.5285
3	0.7083	0.7330	0.7336	0.7612	0.7723
4	0.5533	0.6305	0.6354	0.7248	0.7253
5	0.3284	0.4794	0.4927	0.6753	0.6987
6	0.6049	0.6163	0.6164	0.6164	0.6575
7	0.6397	0.6908	0.6930	0.6976	0.7364
8	0.6330	0.6330	0.6330	0.6817	0.6855
9	0.0241	0.1379	0.1487	0.1851	0.3022
10	0.2568	0.4275	0.4452	0.5295	0.5300
11	0.3759	0.3878	0.3879	0.4442	0.4446
12	0.4452	0.4586	0.4588	0.4998	0.5286
13	0.4853	0.6185	0.6284	0.7320	0.7524
14	0.5168	0.5493	0.5497	0.5578	0.5748
15	0.5440	0.5767	0.5776	0.5896	0.6647
16	0.5402	0.5485	0.5485	0.5874	0.6246
17	0.2849	0.4276	0.4392	0.4684	0.4961
18	0.0088	0.3220	0.4400	0.5345	0.6105
19	0.5848	0.7737	0.7963	0.7965	0.8046
cum% explained Variance	46	54	55	60	63
*=After Varimax Rotation, Centroid 3 was dropped; absorbed into centroids 1, 2, 4 and 5.					

VITA

Teri Sue Holmes

Candidate for the Degree of

Doctor of Philosophy

Thesis: EXPLORATION OF ANTECEDENTS OF ENVIRONMENTALLY RESPONSIBLE BEHAVIOR BY STAKEHOLDERS IN GRAND LAKE WATERSHED

Major Field: Environmental Science

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Environmental Education at Oklahoma State University, Stillwater, Oklahoma in May, 2013.

Completed the requirements for the Master of Science in Environmental Management at Oklahoma State University, Stillwater, Oklahoma in 2007.

Completed the requirements for the Bachelor of Arts in Communication at University of Tulsa, Tulsa, Oklahoma in 1997.

Experience:

2010—Present: Magellan Midstream Services, L.P.
Air Compliance Specialist

2009—2010: ALL Consulting
Research Communication Specialist

2008 --2009: Frontier Field Services, LLC.
Environmental Compliance Specialist

1991—2007: Williams
State Government Affairs Information Coordinator

Professional Memberships:
Air and Waste Management Association