

CONNECTION TO NATURE:  
DEVELOPING A MEASUREMENT SCALE

By

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To Laura Pennisi and to Lori Love

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## DEFINITION OF TERMS AND ABBREVIATIONS

Affect	Affect implies emotions, moods, and sentiment (Myers, Saunders, & Birjulin, 2004). In the tripartite theory of attitudes, affect is the emotional, non-cognitive, aspects of attitudes (Petty, Fabrigar, & Wegener, 2002).
Altruistic	Altruistic refers to other human centered views and value orientations. Altruism is an act of helping others, while ignoring self-interest.
Attitudes	Attitudes are an evaluation of an object as positive or negative. Attitudes include cognitive, affective and behavioral aspects. As constructs, attitudes are not directly observable, but inferred through responses. Attitudes are dispositional tendencies that can be temporary or long-standing (Eagly & Chaiken, 1993) pp. 1-4).
Beliefs	Beliefs are cognitively based associations about the characteristics and qualities of an object. People have many beliefs about objects and these beliefs can be temporary or long lasting. (Ajzen & Fishbein, 1980) pp.62-63). Beliefs mediate between attitudes and values (Stern & Dietz, 1994). Stable beliefs form values and represent the core of one's belief system or value orientations (Vaske & Donnelly, 1999).
Biospheric	Nature centered views and value orientations. An ecological centered view of the world in line with Leopold's land ethic whereas ecosystems and all of their natural components are highly valued as essential.
CNS	Connectedness to Nature Scale (Mayers & Frantz, 2004). Unidimensional scale developed to measure CTN.
CTN	Connection to nature was defined by Mayers & Frantz (2004b) as a unidimensional construct that is emotional in nature relating to feeling oneness with nature. Schultz (2002) has described CTN as a tripartite structure with affective, cognitive and behavioral aspects. Connection to nature is likely related to identity (Clayton, 2003).
Egoistic	Self centered views or self-interest.
Environmental concern	The expression of value orientations and refers to the affective concerns about environmental issues (Schultz, 2000, 2001, 2002). Schultz (2002) found three concerns related to the value orientations in Stern's Value-Belief-Norm Theory: egoistic, altruistic, and biospheric (Stern, 2000; Stern & Dietz, 1994; Stern, Dietz, Abel, Guagnano, & Kalof, 1999).

Environmental identity	Defined by Clayton & Opatow (2003) as “the way in which we define the environment, the degree of similarity we perceive between ourselves and other components of the natural world, and whether we consider nature and nonhuman natural entities to have standing as valued components of our social and moral community” (p. 8). Furthermore they propose that environmental identity has multiple meanings, is dynamic in nature and occurring along a dimension of varying levels of social influence (Clayton & Opatow, 2003).
EEB	Environmentally responsible behaviors. Behaviors that benefit the environment such as recycling, composting, conservation and reducing consumption.
Norms	Beliefs about what most people, whether your in-group, significant others, family or society, does and expects in regards to attitudes and behaviors. Norms affect behavior if people are motivated to comply and conform accordingly.
Personal identity	The core aspect of self. This is the aspect of self-concept that defines who we are – our values, goals, the groups we belong to, roles we play and our behavior. Personal identity provides consistency in self-concept across situations. Personal identity is not well defined by either Social Identity Theory (where it is defined by the groups we join) or Identity Theory (where it is defined by the roles we play) (Hitlin, 2003; Stets & Biga, 2003; Stets & Burke, 2000; Zavestoski, 2003).
Subjective norms	Beliefs that significant others think you should or should not perform the behavior.
Values	Values are associated with relatively abstract concepts such as equality, spirituality and peace (Eagly & Chaiken, p. 5). Rokeach (1973) defined values as beliefs that are intimately linked with self and organized into relatively enduring hierarchies of importance. According to Rokeach (1973), there are two types of values: 1) terminal values which are general goals or end-states of existence, and 2) instrumental values which are modes of conduct. In other words, a value is “an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence” (Rokeach, 1973, 5). Therefore they are life goals or principles (Schultz, Shriver, Tabanico, & Khazian, 2004). Values are thought to be relatively low in number compared to attitudes, which can number in the thousands. Rokeach (1973) identified 36 values (18 instrumental values and 18 terminal values) (Vaske & Donnelly, 1999).

VBN	Value-Belief-Norm Theory. A synthesis theory developed to predict ERB. It is a synthesis of norm activation theory, value theory and an ecological worldview or encompassing belief (the New Environmental Paradigm or NEP) (Stern, 2000).
Worldview	The pattern of beliefs or value orientation. The New Environmental Paradigm (NEP) is an example of a worldview. Since a worldview is a belief system it is primarily cognitive in nature and it influences attitudes.

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CONNECTION TO NATURE:  
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Time spent outside in outdoor recreation is in decline for both children and adults. Only 36% of Americans have visited a national park in the past ten years. Children spend an average of just 50 minutes each week in outdoor recreation. This lack of time spent outside could lead to a lack of connection to nature and in turn a decline in support for park and wilderness areas and the environment in general.

The connection to nature construct bridges social identity theory, identity theory and value theory as an aspect of personal identity. Connection to nature is related to the values that guide behavior, role identities and group identities. Hence it may be a significant motivator of behavior, including park visitation and environmentally responsible behaviors. Connection to nature can also be seen as a “hard to define” benefit of outdoor recreation experiences and as such is related to other benefits such as restoration and psychological well-being.

To better understand, define and measure a person’s level of relationship or connection to nature a mixed methods approach was used for this study. This approach facilitated a more thorough understanding of people’s relationship to nature and aided in developing a scale that reflected this understanding. Interviews were conducted to explore how people felt about nature.

Thematic analysis of the interviews revealed nine themes (appreciation, awe, caring behaviors, fear, identity, oneness, restoration, sorrow and spirituality) that describe different aspects of how people feel about the natural world. Items were developed for each theme based on the analysis and the interviews themselves. The initial pool of 220 items were analyzed through a series of tests until a final survey instrument was developed. The final scale consists of 26 items across six dimensions (awe, fear, identity, restoration, sorrow and spirituality). Confirmatory factor analysis confirmed the fit of the model to the data. Theoretical and practical implications of the connection to nature scale and construct are discussed, including the implications for promoting environmentally responsible behavior. Limitations of this project and recommendations for future research are also discussed.

## CHAPTER 1 INTRODUCTION

Most people in modern western society have little contact with nature. The typical American spends just five minutes per day in outside recreation (Robinson & Godbey, 1997). While modern children grow up in a manner practically devoid of natural experiences (Louv, 2005), less than 16% of Americans have visited a wilderness area (Roggenbuck & Driver, 2000). This shift in visitation has come at a time when children are spending less and less time recreating outdoors in nature (Juster, Ono & Stafford, 2004; Louv, 2005). Time spent in outdoor activities has been cut in half since the early eighties, with children now spending an average of just 50 minutes per week in outdoor activities (Juster, Ono & Stafford, 2004). Today's children, our next generation of potential park visitors, are said to be suffering from both videophilia and nature deficit disorder (Louv, 2005; Pergams & Zaradic, 2006). Nature has become scary and disgusting for many of today's youth (Bixler & Floyd, 1997).

Visitation to national parks has been declining over the last ten years. Only 36% of Americans surveyed had visited a national park in the past two years, and this percentage decreases for minorities (Cordell, Green, & Betz, 2002; Driver & Ajzen, 1996; Roggenbuck & Driver, 2000). The decline in park visitation is associated with an increase in videophilia or electronic media use (e.g., television, video games, surfing the internet and movies) (Pergams & Zaradic, 2006).

While Pergams and Zaradic (2006) warn that this trend may signal a move away from appreciating nature, more encouraging trends are also taking shape. There is a rise in popularity of wildlife tourism, ecotourism, and wildlife watching. In fact, wildlife watching has become the fastest growing recreational activity in the United States (Cordell & Overdevest, 2001).

According to the biophilia hypothesis, humans have an innate attraction to nature and other

species (Wilson, 1984). The natural world elicits positive emotional responses such as fascination, attraction, inspiration, self-confidence, peace, relaxation, aesthetics, and meaning (Kellert & Wilson, 1993). Perhaps a lack of sufficient contact with nature motivates many people to seek nature's restorative qualities and rediscover their connection with nature.

Without outdoor recreation experiences, people will likely lose interest in preserving wilderness and will be missing an aspect of human experience that can greatly enrich their lives (Driver & Ajzen, 1996; Roggenbuck & Driver, 2000). Having nature-based experiences can lead to a connection to nature (CTN) as well as spiritual and psychological well-being (Kaplan, 1995; Kaplan & Kaplan, 1989; Kaplan & Talbot, 1983; Ulrich, 1983; Wohlwill, 1983).

### **Connection to Nature**

Connection to nature is often described as a sense of oneness with nature. It can be both an experience as well as a construct tied to personal identity. As an experience, connection to nature is often experienced as an epiphany, deep experience, optimal experience or even spiritual experience. It can be a self-transcendent peak experience that is self-actualizing, such as those described by Maslow (1970) or an experience that includes Csikszentimihalyi's (1975) concept of flow (Dowdall, 1998; Snyder, 1989). During encounters with wildlife and stays in the wilderness, people often report parallel experiences.

According to DeMares and Krycka (1998), powerfully transcendent or peak experiences have resulted from experiences with wildlife. These authors reported that peak experiences with whales and dolphins often involved eye-to-eye contact or perceived intention on the part of the animal to make contact with the human, a sense of harmony, connection and aliveness. These experiences with cetaceans allowed those individuals to rediscover a part of themselves through an elevation of consciousness.

Wilderness excursions, especially solo experiences, have also inspired peak experiences. These powerful experiences not only lead to restoration, but also to feelings of oneness with nature that can lead to a change in values and attitudes (Driver & Ajzen, 1996; Kaplan & Talbot, 1983; Mannell, 1996; Roberts, 1996; Roggenbuck & Driver, 2000; Schreyer, Williams, & Haggard, 1987; Schroeder, 1996). For example, nature can increase confidence in our abilities and encourage a strong, positive sense of self (Clayton, 2003). Pohl, Borrie, and Patterson (2000) found that wilderness experiences increased women's feelings of self-sufficiency, self-worth, confidence, connection and openness with others, mental clarity, and provided a change in perspective. Changes in perspective include reevaluating societal norms, establishing a deep connection with nature, changing priorities and forming a new world-view (Pohl, Borrie, & Patterson, 2000). For these women, wilderness experiences allowed them to fulfill innate psychological needs that lead to optimal self-motivation: autonomy (self-direction), competence and relatedness (connection) (Ryan & Deci, 2000).

Optimal experiences in nature or with wildlife often lead to a deep attachment to nature or to a prevailing connection to nature (CTN). Studies of environmentalists revealed that significant life experiences in nature during childhood have led to environmental commitment (Chawla, 1998, 1999, 2001). Having a deep attachment to nature, or sense of oneness with nature, would result in identifying with nature or nature becoming an important part of self-concept or identity. This deep attachment or CTN is likely similar to place attachment but more generalized as it relates to all of nature rather than a specific place. Connection to nature is also similar to place attachment in that it is related to self-concept (Haggard & Williams, 1992) or more precisely to personal identity.

As a construct tied to personal identity, connection to nature is tied to the values that guide behavior. Personal identities are maintained and fostered through self-affirmation and experiences. In particular, authentic leisure experiences which are consistent with identity strengthen personal identity (Haggard & Williams, 1992; Hitlin, 2003; Kelly, 1983; Stets & Burke, 2000). This type of prevailing connection to nature that is part of self-identity may be related to a sense of place, as it is associated with extended stays in wilderness and a deep connection to the land (Borrie & Birzell, 2001; Schreyer et al., 1987; Williams, Haggard, & Schreyer, 1989).

### **Theoretical Framework**

Personal identity is incorporated in both Social Identity Theory and Identity Theory. Identity Theory is generally focused on role identities that help define and categorize the self. Social Identity Theory is concerned with how groups we belong to influence and form identities (Hitlin, 2003; Hogg, Terry & White, 1995; Stets & Burke, 2000). Personal identity is concerned with more than the roles we play and the groups we belong to, as it is the core aspect of self. Personal identity is the view of the self as a unique and distinct individual consisting of values, goals and meanings that define the self. Personal identity influences and operates across both role and group identities as the core-self shapes what roles we take on and groups we join (Stets & Biga, 2003; Stets & Burke, 2000). By defining values and influencing both role and group identities, personal identity influences behavior (Hitlin, 2003; Zavestoski, 2003). Personal identity provides us with a sense of continuity, “a cross-situational sense of consistency” that integrates as well as differentiates us from society (Hitlin, 2003).

Identity theories are used to better understand CTN. However, one goal of this study is to test the effect of CTN on environmentally responsible behaviors (ERB). Therefore, a synthesis

theory of ERB, Value-Belief-Norm Theory, will be used to understand the relationship of connection to nature to environmentally responsible behaviors.

### **Predicting Environmentally Responsible Behavior**

First, as a preface to the following discussion, it must be noted that research in predicting environmentally responsible behavior often uses asks for either the intention to perform a future behavior or a self-report of past behavior as the outcome measure. A concern in measuring ERB is the validity of using self-reported behavior and behavioral intentions. Studies that have measured both self-reports and observed behavior have found a lack of correspondence. People often overestimate self-reported behavior (Vining & Ebreo, 2002). The advantage of using self-reports is that some behaviors are not observable and self-reports are easy to obtain – especially in terms of a list of behaviors for survey research (Ajzen & Fishbein, 1980). Certainly in terms of a list of ERB’s self-reports or intentions make more sense. However, it is always better to measure an observed behavior rather than rely on self-reports (Vining & Ebreo, 2002), but observational and experimental research are difficult to incorporate in scale development.

Regardless of outcome measure (intentions or self-report), research in predicting environmentally responsible behavior (ERB) often focuses on values and attitudes while ignoring personal identity. But as influencers of values, attitudes and behaviors, personal identity may well add significantly to the prediction of ERB. Identity theory holds considerable promise for research in ERB. Measures of identity increase prediction in two attitude models. A measure of blood donor role identity increased prediction of intentions and behavior of blood donation using the Theory of Reasoned Action. (Charng, Piliavin, & Callero, 1988). Whereas, a measure of identity as a green consumer was a significant independent predictor of intentions to purchase organic produce using the Theory of Planned Behavior (Sparks & Shepherd, 1992).

Value-Belief Norm Theory (VBN), a model developed to predict ERB, is a synthesis of norm activation theory, value theory and an ecological worldview or encompassing belief (i.e., the NEP or new environmental paradigm). Five variables sequentially and causally link the theories together in a chain leading to behavior (Figure 2-3). The five variables are: personal values (altruistic, egoistic and biospheric), an environmental worldview (the NEP), awareness of adverse consequences (AC) to something valued, an ascription of responsibility (AR) to avert the consequences, and personal moral norms for positive action (Gardner & Stern, 1996; Stern, 2000; Stern et al., 1999). The chain operates under the assumption that more stable values affect worldview. Worldview then affects perceived consequences and responsibility, which leads to personal moral norms or a sense of obligation and a decision to take action (Stern, 2000).

In this study, the predictive validity of CTN will be ascertained by testing the relationship between CTN and ERB. Ideally this should be done by adding CTN to both the VBN and TRA models. However, adding CTN to the models is beyond the scope of the current study. Furthermore, to determine the predictive value of identity and CTN, an appropriate measure of CTN must be used, that is a measure that both properly defines the construct and addresses personal identity. Therefore, the purpose of this study is to develop such a measure.

### **Statement of the Problem**

Although neither the deep, optimal and spiritual experience or the sense of connection to nature that is tied to identity have been investigated sufficiently, several authors have written about various aspects of connection (Roberts, 1996; Schroeder, 1996). Authors in the field of outdoor recreation have discussed the concept of feeling connected to nature, but research that includes the concept is limited (Borrie & Roggenbuck, 2001; Driver & Ajzen, 1996; McIntyre & Roggenbuck, 1998; Roggenbuck & Driver, 2000). Driver and Ajzen (1996) call for the need to

study this phenomenon and develop a scale that measures it, as well as study the benefits related to having a CTN or nature identity.

Connection to nature (CTN) research has not reached a consensus in terms of defining CTN. Qualitative work done specifically on CTN was not found. Therefore a review of qualitative research that studied peak experiences or profound emotional experiences in nature was conducted. Five common themes were found in this research: awe, appreciation, restoration, oneness and a desire to care for nature (Beyer, 1999; Doran, 2002; Dowdall, 1998; Dufrechou, 2002; Dunkerly-Kolb, 1999; Snyder, 1989). Pennisi, Pennington-Gray, 2007b) developed and tested items based on these themes and four factors emerged. Although this was preliminary research, it does suggest that connection to nature is a multi-dimensional construct.

Moreover, a consensus definition for connection to nature does not exist in the quantitative work on CTN, thus there are several scales measuring CTN and similar constructs (see Table 1-1). These scales include the experiential Connectedness to Nature Scale (CNS) (Mayer & Frantz, 2004a), single-item Venn diagram measure of Inclusiveness of Self (Schultz, 2002), a computer dependent Implicit Association test (Schultz et al., 2004), and a measure of environmental identity (Clayton, 2003).

The Mayer & Frantz (2004a) CNS scale items were developed based on the writings of Aldo Leopold and are assumed to represent a single experiential dimension. When factor analyzed, results indicated that some of the items do not fit. (Mayer & Frantz, 2004b; Pennisi, Pennington-Gray, 2007b). The scale also assumes the construct of CTN is unidimensional, a likely limitation.

Clayton's Environmental Identity Scale (2003) also assumes a single dimension and several of the items in this scale focus on the group identity of "environmentalist." Connection to

nature is concerned with personal, not group identity (although the two can overlap). Identification as an environmentalist may be resisted and even thought of as negative by some. Even those who may feel strongly attached to nature may resist being labeled an environmentalist because of the negative connotations sometimes associated with environmentalists (Clayton, 2003; Clayton & Opatow, 2003).

Schultz's (2002) measure of Inclusiveness of Self is a single item measure; therefore, there is a mono-method bias. Respondents also find the item difficult to interpret. Schultz's (2004) implicit association test is a computer dependent measure that flashes words that subjects rate as "me" or "not me." This measure has the inherent problem of being computer dependent and results in very low correlations (Schultz et al., 2004).

A similar method, Q-sort methodology was used by Reist (2004) to assess ecological identity. Although not computer dependent, subjects were asked to state whether a list of 105 items were either "part of me" or "not part of me." The Q-sort clusters people, not items and relies solely on one-word items such as tree or heart. Therefore, it also may not capture all of the aspects of CTN. The study was exploratory and a scale was not developed.

The identity literature does not provide a clear way to measure personal identity. Personal identity has not been studied or discussed extensively (Stets & Burke, 2000). Studies that incorporated identity measures into their research typically used group or role identity measures, not personal identity. Often these studies used two or three items asking, for example, if a role such as "sports fan" identifies the respondent. Stets and Biga (2003) measured environmental identity using 11 bipolar statements asking how participants view themselves in relation to the environment.

Hitlin (2002) measured volunteer identity using a three-item scale measuring identity importance and a seven item scale measuring perceived expectations of others. The perceived expectations were actually items developed as subjective norms (Charng et al., 1988).

Although all of the scales discussed above measure constructs similar to CTN, they are all missing some probable aspects of CTN. Many of the items may represent some aspect of the CTN construct well such as identity or oneness and can therefore be used in the development of a comprehensive CTN measure. Although affective dimensions discussed in other research, such as awe or restoration, are likely missing. However, since there is little agreement as to what CTN is, scale development must begin with a qualitative approach that examines what a relationship with nature means to people.

### **Purpose of the Study**

The purpose of this mixed-methods study was to first define a connection to nature construct and then develop a scale to measure the construct. The decision to use both qualitative and quantitative methods was made in order to provide a better definition of the CTN construct and to ensure the development of an instrument that best reflects an empirically derived definition, reflecting all relevant aspects of the construct. Also, the relationship of CTN to values and ERB is tested.

### **Research Questions**

In order to accomplish the goals of this study, a mixed methods study was conducted with several data collection phases. The research answered the following questions, which are grouped by qualitative and quantitative method.

#### **Qualitative methods were used to answer the following:**

1. How do people define connection to nature? That is what themes are common when people describe their relationship with nature?

2. What items can be derived from the themes that emerged from the descriptions of connection to nature?
3. Are the items and survey understandable to the intended audience?

**Quantitative methods were used to answer the following:**

4. Do the items show good psychometric qualities?
5. When the items are tested in a survey, do different components to connection to nature result?
6. Is there a relationship between connection to nature and environmentally responsible behavior (as self-reported behavior)?
7. Are values related to connection to nature?
8. What is the relationship of connection to nature and other variables that indicate convergent and discriminant validity?

**Delimitations**

This study has a number of delimitations and limitations that should be kept in mind when considering the generalizability of the results. The study was delimited to narrow the scope and feasibility of the study. The delimitations are listed below.

- Qualitative investigation was delimited to a thematic analysis without further pursuing a grounded theory analysis as to how such relationships with nature form.
- The study was delimited to only interviewing and surveying adults between 18 years-old and 59 years-old.
- This study was delimited to using a convenience sample of University students for pre-testing the survey instrument.
- Internet surveys were non-random convenience samples where participation was voluntary.

**Limitations**

In addition to the delimitations listed above, this study has the following limitations listed below, which should be used to consider the generalizability of the results.

- Several samples were generated by contacting groups via e-mail and asking them to volunteer to take an online survey via the internet. Therefore, these results are not generalizable to a population.
- Results from samples of University of Florida college students cannot be generalized to other populations of college students or even to the student body at the University of Florida.
- Results taken from the internet survey cannot be generalized to any population.

## **Summary**

This chapter provided the foundation for this investigation that includes a description of the research problem, the purpose of the study, significance of the research, research questions, delimitations, limitations and definition of terms. The lack of contact with nature and decline in park and wilderness area visitation signals a need to better understand our connection to nature. The purpose of this study was to better understand people's relationship with nature, define the connection to nature construct and develop a scale that measures all aspects of connection to nature. This research also provides a means for measuring the relationship of connection to nature in environmentally responsible behavior models.

In Chapter 2, a review of related literature is presented to provide theoretical and empirical support for the role of identity theory in defining connection to nature and the relationship of connection to nature and environmentally responsible behavior. An overview of the methods used in this study to answer the research questions is provided in Chapter 3. The results from the study are presented in Chapter 4. Finally, in Chapter 5, the implications of the results for defining and measuring connection to nature, and the role of connection to nature in predicting environmentally responsible behaviors are presented, along with recommendations for future research.

Table 1-1. Scales for CTN and similar constructs

Author	Year	Scale name	Constructs measures
Mayer & Frantz	2004	CNS (connectedness to nature scale)	Single experiential dimension of CTN
Schultz	2002	Inclusiveness of Self	CTN – single item
Schultz, et al	2004	Implicit-Association Test (computer-generated)	Identification with Nature
Clayton	2003	Environmental Identity	Environmental Identity
Stets & Biga	2003	Environmental Identity	Environmental Identity

## CHAPTER 2 LITERATURE REVIEW

In this chapter, a review of related literature is presented to provide theoretical and empirical support for the role of identity theory in defining connection to nature and the relationship of connection to nature (CTN) to environmentally responsible behavior (ERB). Since ERB is most often researched in the context of attitudes or values and personal identity is related to values, this chapter will begin with a discussion of Value Theory. Next, the literature related to self theories, that is identity theory, social identity theory and their relationship to personal identity and values and behavior will be reviewed. Finally, CTN will be explored including how it is a form of identity and the potential relationship of CTN to ERB.

This progression of the literature review illuminates a conceptual picture of relationships between CTN, identity and values. Connection to nature is a form of identity and identities are made up of values among other things. If the reader thinks of the relationship of CTN to identity and to values as layers of an onion, then this may aid in following this line of reasoning. Since CTN is an identity made up of values, then in order to understand CTN, it is best to begin with an understanding of values, then identity and arrive at CTN as depicted in Figure 2-1. Beginning at the top, with values, layers will be peeled back until we arrive at CTN.

### **Value Theory**

Values are attitudes associated with relatively abstract goals such as equality, spirituality and peace (Eagly & Chaiken, 1993 p. 5). Attitudes are an evaluation of an object as positive or negative. Structurally, attitudes include cognitive, affective and behavioral aspects. Although values have been classified as cognitions by some (Fulton, 1997; Fulton, Manfreda, & Lipscomb, 1996; Vaske & Donnelly, 1999; Vaske, Donnelly, Williams, & Jonker, 2001), theorists now believe they also have strong affective and behavioral aspects (Eagly & Chaiken, 1993;

Schwartz, 2005). Some view the affective aspect of attitudes as dealing solely with the evaluative component of attitudes. However, affect is the emotional, non-cognitive, aspect (Petty et al., 2002); the feelings, emotions and sentiment (Myers et al., 2004) associated with the attitude object. Beliefs are the most one dimensional construct in the hierarchy, consisting of cognitive thoughts and ideas associated with the attitude object (Eagly & Chaiken, 1993). However, due to the relatively recent popularity and dominance of cognitive theory in social psychology, the cognitive aspect of attitudes were emphasized despite research supporting a tripartite structure (see Eagley & Chaiken, 1993 pp. 10-20 for a more detailed discussion).

As constructs; attitudes, beliefs and values are not directly observable, but inferred through responses. Organized hierarchically (Figure 2.2), values are at the bottom of the hierarchy and thought to form value orientations or belief systems that influence attitudes, which influence behavior (Vaske & Donnelly, 1999). Beliefs mediate between attitudes and values (Stern & Dietz, 1994). Values are also considered to be relatively stable, representing the core of someone's belief system (Rokeach, 1973; Schwartz, 1992; Stern & Dietz, 1994; Vaske & Donnelly, 1999). Attitudes and beliefs are dispositional tendencies that can be temporary or long-standing (Ajzen & Fishbein, 1980; Eagly & Chaiken, 1993).

Rokeach (1973) defined values as beliefs that are intimately linked with self and organized into relatively enduring hierarchies of importance. According to Rokeach (1973), there are two types of values: 1) terminal values which are general goals or end-states of existence, and 2) instrumental values which are modes of conduct. In other words, a value is "an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence" (Rokeach, 1973, 5). Values then, are life goals or principles (Schultz et al., 2004). Values are thought to be relatively low in

number compared to attitudes, which can number in the thousands. Rokeach (1973) identified 36 values (18 instrumental values and 18 terminal values).

Shalom Schwartz has worked cross-culturally to refine value theory and develop a model for addressing and measuring values (Schwartz, 1992, 1994). Values primarily represent goals or motivational targets and have five main criteria or features: 1) values are beliefs that are “inextricably tied to emotion, not objective cold ideas” (Schwartz, 2005); 2) values are motivational goals; 3) values are abstract, transcending specific situations; 4) values guide behavior and evaluation by serving as criteria; and 5) values are ordered by importance and prioritized hierarchically (Schwartz, 1992, 2005). Since there are relatively few values, and since values are often culturally defined, their hierarchical arrangement defines individuals’ judgment frameworks (Schwartz, 1992, 2005).

Schwartz condensed Rokeach’s 36 values to 10 core values arranged across two orthogonal dimensions. These dimensions are “openness to change” and its opposite “conservatism”; and “self-enhancement” versus “self-transcendence.” Openness to change includes the values self-direction (creativity, freedom, choosing, creating, exploring) and stimulation (excitement, novelty and challenge). Conservation includes the values security (safety, stability of relationships, self and society), conformity (restraint, obedience, sticking with social norms) and tradition (respect, humility, devoutness commitment, acceptance of religious or cultural customs and ideas). Self-enhancement represents the values of achievement (competence, success, ambition) and power (authority, wealth, prestige, social status, control, dominance of people or resources). Self-transcendence consists of universalism (social justice, equality, understanding, appreciation, tolerance, protection of people and nature) and benevolence (helpfulness, preserving and enhancing one’s in-group, altruism). The tenth value, hedonism, has qualities of

both openness to change and self-enhancement as the hedonistic goals here are personal pleasure and sensuous gratification (Schwartz, 1992, 2005).

**Do values predict environmentally responsible behaviors?** Research in environmental psychology has looked to values to build theory predicting environmentally responsible behavior (ERB). Values related to self-transcendence, and more specifically, benevolence have been used. One aspect of benevolence, altruism, has been studied extensively when trying to explain ERB and ERB intentions. Theories based on altruism include Moral Norm Activation Theory (Schwartz, 1977) and the Actively Caring Hypothesis (Geller, 1995). In terms of environmental behavior, however, researchers have noted two types of altruism: altruism toward other humans and altruism toward other species and nature. People, however, can act on the behalf of the environment purely for self-interest and not for any altruistic reasons whatsoever. Therefore, it is believed that three value orientations relate to environmental behavior: Self-interest or egotism, altruism toward other people or socio-altruism, and altruism toward other species or biocentrism (Merchant, 1992; Schultz, 2001; Schultz & Zelezny, 1999; Stern & Dietz, 1994; Stern et al., 1999).

Although Schwartz's self-transcendent value orientation includes measures of caring for others and nature, there is not a clear separation of values to protect human life (altruism) and a value to protect the earth (biocentrism). Therefore, Stern and Dietz (1994) added several items (preventing pollution and respecting the earth) that reflected biospheric concerns to a value survey. Altruistic and biospheric items failed to factor separately. Rather than add values to Schwartz's scale, Wesley Schultz tested for a difference in the three value orientations and altruism by measuring concern. Schultz found evidence for egoistic, socio-altruistic and biospheric concern for the environment (Schultz, 2000, 2001).

A direct link between values and environmentalism has also been found. Self-transcendent values have been linked to environmental attitudes and behaviors (Stern, 2000; Stern & Dietz, 1994). Universalism was positively related to ecocentrism and an environmental worldview (using the New Environmental Paradigm or NEP). Benevolence was negatively related to anthropocentrism (Schultz & Zelezny, 1999). Schultz and Zelezny (1999) also found the value power to predict lower NEP scores, lower ecocentrism and higher anthropocentrism scores. Those motivated toward environmental concern by self-interest, who scored high on anthropocentrism, had values related to power, tradition, and security (Schultz & Zelezny, 1999). Schultz and Zelezny concluded that a self-enhancement value orientation has a less inclusive definition of self that does not include others. However, those who have a self-transcendent value orientation have a more expansive definition of self that includes other people and other living beings (Schultz & Zelezny, 1999).

These three value orientations, egoistic, socio-altruistic and biospheric, are found in Value-Belief Norm Theory. Value-Belief Norm theory (VBN) is a synthesis of norm activation theory, value theory and an ecological worldview or encompassing belief (i.e., the NEP) to explain environmentally responsible behavior. Five variables sequentially and causally link the theories together in a chain leading to behavior (Figure 2-3). The five variables are: personal values (altruistic, egoistic and biospheric), an environmental worldview (NEP), awareness of adverse consequences (AC) to something valued and ascription of responsibility (AR) to avert the consequences, and personal moral norms for positive action. (Gardner & Stern, 1996; Stern, 2000; Stern et al., 1999). The chain operates in that order with the more stable values affecting worldview, which affects perceived consequences and responsibility, which leads to personal moral norms or a sense of obligation and a decision to take action (Stern, 2000).

Schwartz's norm activation model predicts that altruism results from the activation of a personal moral norm or obligation. The moral norm is activated when the person experiences both an awareness of the consequences (AC) to another or to something they value and personally feel responsible for (ascription of responsibility AR). The theory has been applied to research in ERB by predicting that people will act on behalf of the environment when aware of the negative consequences of their actions and when they feel responsible (Allen & Ferrand, 1999; Stern & Dietz, 1994). For example, at Shiloh National Military Park in Tennessee, interpretive messages describing damage to the park's resources and asking for visitors to help protect park resources by being an example to others. Other visitors were also asked to check for damage using a "Heritage Guardian" form (a combination of AC and AR). Both conditions were found equally effective in reducing cultural resource damage (i.e. vandalism to monuments, statues and cannons) in the park (Gramann, 2000; Vander Stoep & Gramann, 1987).

VBN is related to connection to nature and the sense of self through the three value orientations. First, as the sense of self expands beyond egoistic values to other people, concerns become altruistic. Second, when the sense of self expands beyond other humans to include animals, plants and other aspects of the natural world, biospheric concerns develop. Therefore, CTN which encompasses biospheric values is the foundation for developing value-based concerns and hence the motivation for environmentally responsible behaviors (Schultz et al., 2004). Since egoistic, socio-altruistic and biospheric value orientations involve self-concept, they are related to one's sense of identity.

### **Identity Theory**

Social identity theory from social psychology and identity theory from sociology are both concerned with how people define and categorize themselves (Hogg et al., 1995; Stets & Biga, 2003). Social identity is concerned with the groups a person belongs to, such as American,

Floridian, Sierra Club member or Gator fan, and how group membership both identifies similarities with the group and dissimilarities with those outside of the group. Identity Theory is concerned with the roles people use to define themselves such as husband, son, gardener, or astronomer. Both role and group categorizations can exist simultaneously such as serving the role of treasurer as a member of a club or the role of cook as member in the family. Furthermore, people have both multiple group identities and multiple role identities (Stets & Burke, 2000). Role identities, as implied, are related to behavior. Role-related behavior is a prescribed set of expectations associated with the role (Hogg et al., 1995). For example, the role of teacher or gardener implies a certain set of behaviors.

As stated in Chapter 1, personal identity, although related to role and group associations, is more a core aspect of self. Personal identity is made of all the variables of personality, such as idiosyncrasies, values, goals and meanings that define the self as a unique individual. Personal identity or the core self shapes behavior by defining values and influencing the roles we take on and groups we join (Stets & Biga, 2003; Stets & Burke, 2000); (Hitlin, 2003; Zavestoski, 2003).

Hitlin (2003) found values to be predictors of personal identities. Like values, personal identities are relatively stable; however, they are not static. Personal identity can change with behavioral feedback and reflection. For example, a certain behavior, such as riding the bus to work, can cause us to reflect on our values and such self-reflection can shift values and alter personal identity. Therefore, there is a cycle or feedback loop whereby personal identity shapes behavior and other identities, yet behavior and group and role identities shape our personal identity (Hitlin, 2003). For example, cognitive consistency, cognitive dissonance, experience and emotions can reshape identity when we do something to help another.

Although personal identity permeates role and group identities, all are interrelated and intertwined (Hitlin, 2003). However, not all identities are salient at once (Clayton, 2003). No matter the salient identity, we are motivated to act in accordance with our personal identity. This allows for authenticity and a feeling of being in-touch with and in keeping with our true self. This is important because our personal identity, like our values, are inextricably tied to emotions (Hitlin, 2003; Schwartz, 2005). Hitlin (2003) believes identities, like values, are ordered by importance in such a way that role and group identities revolve dynamically around the core-self. This author likens that to an atom surrounded by the path of electrons, where each path represents an identity (Figure 2-4). The various identities fit together just much like molecules do (Figure 2-5).

An important aspect of identity is salience. Behavior is influenced by the salient identity. The likelihood that a given identity is salient is a function of the strength of that identity or the person's commitment to it (Zavestoski, 2003). A person may have a connection to nature, but the centrality of that identity to self will determine how much it influences their behavior. Environmental values deemed central to self were found to lead to ERB (Verplanken & Holland, 2002).

The following may help to further illustrate this point. There are identities that include occupation, group memberships, ethnicity, gender, geography, and individual interests and characteristics. However, someone does not always operate in one mode such as student mode or child mode. Different identities may lead an individual to act or at least respond differently among different groups, making identity context-dependent. Personal identities, social identities and role identities categorize these different identities.

These identities are also culturally and historically defined. For example, an American woman in the year 2000 has a much different identity than a woman from an undeveloped country in 2000 or an American woman in 1800. Furthermore, these multiple and culturally defined identities are in a dynamic fluctuating state. Which identity is operating at a given moment depends on salience and the triggers that make that identity salient. (Clayton, 2003; Twigger-Ross, Bonaiuto and Breakwell, 2003; Cushman, 1990). Therefore, one may have both environmentalist, trendy and social as identities. However, if one is getting ready for a big party, the trendy and social identities may “win out” causing a multitude of purchases, including disposable party items and the latest fashions. But if the personal identity is one of being connected to nature, purchases and partying will be influenced by this core identity. The core identity then is prominent and the more prominent or central an identity the more likely it will become salient and influence behavior (Stets & Biga, 2003).

The study of identity is significant because issues that are personally relevant grab attention, arouse emotions and motivate behavior (Bator & Cialdini, 2000; Petty & Cacioppo, 1981; Petty et al., 2002). Identity influences who we associate with, what we value, how we act toward what is considered inside and outside of our scope of self (it is related to prejudice), and our beliefs of fairness and justice and moral consideration (it is made of values) (Clayton, 2003; Clayton & Opatow, 2003; Twigger-Ross, Bonaiuto and Breakwell, 2003; Hogg, et al 1995; Hitlin, 2003). “Identity is both a product and a force: an assortment of beliefs about the self and a motivator of particular ways of interacting with the world” (Clayton, 2003, p. 46). Identity predicts behavior by defining values and attitude strength and by providing authenticity of our true self. (Hitlin, 2003). Environmental issues are not seen then as mere costs and benefits as in

the economic man model, but rather as how they relate to self-concept and group memberships. This motivation comes from within; it is intrinsic (Clayton, 2003; Clayton & Opatow, 2003).

Examples of people who have strong environmental identities and a strong connection to nature that was a motivating force in their lives, includes activists Julia Butterfly-Hill (protested logging by living in a redwood wood tree for two years) and Rachel Carson (author of “Silent Spring” which led to the beginning of the modern environmental movement in the 1960’s eventually leading to the creation of the EPA, the banning of DDT and other environmental protection acts such as the Clean Water Act). Those with a strong place identity or attachment to place which motivated protective action include John Muir who had a strong attachment to Sierra Nevada mountains, Henry David Thoreau who wrote about Walden Pond and a more simplified, connected and joyous life, and Aldo Leopold who wrote about the restoration of a Wisconsin sand farm and in so doing, gave us his land ethic.

Connection to nature, as a concept related to inclusiveness of self and the self-transcendent value orientations, is a form of personal identity. As such, connection may influence group memberships (e.g. environmental, outdoor recreation, wildlife or gardening groups) and role identities, as someone who is very connected will nurture other species or perhaps be a naturalist, gardener, environmental lawyer or activist. As a personal identity, connection should influence values. When salient, connection will motivate ERB, and if central, connection should be a large motivator of behavior, including general behavior.

Self as part of nature is not purely a matter of identifying self as nature, as humans are obviously different from what is not human (Holmes, 2003). Therefore, others have called for a more relational view to the expansion of a sense of self (Holmes, 2003). In other words, through our relationships, actions and reactions we begin to know who we are (Holmes, 2003). An

overlapping of selves, or including others in the representation of self, is a characteristic of close relationships (Aron, Aron, Tudor, & Nelson, 1991; Cialdini, Brown, Lewis, Luce, & Neuberg, 1997). Just like our relationships to our family members and peers provide a connection to them, our relationship with nature provides a connection or a sense of being a part of something larger than self (Clayton, 2003).

The opposite of connection would be a feeling of being separate from nature or alienated from nature. This view is consistent with modern Western views of humans' relationship to the natural world. Cushman (1990) states that the modern era (beginning in the 16<sup>th</sup> century) marked a shift from agriculture to industry, rural to urban, community to individual and to an emphasis on science. This shift accelerated in America after World War II, resulting in what Cushman (1990) calls the empty self. "This is a self that has specific psychological boundaries, an internal locus of control, and a wish to manipulate the external world for its own personal ends" (p. 600). Cushman (1990) deems this sense of self as empty because it exists in an "absence of community, tradition, and shared meaning." Thus, this empty self experiences "a lack of personal conviction and worth" and a "a chronic, undifferentiated emotional hunger. The post-World War II self thus yearns to acquire and consume as an unconscious way of compensating for what has been lost: It is empty." (Cushman, 1990). The emptier the individual feels, the deeper the desire to be soothed. The soothing manifests itself in an addiction; seeking things to fill the emptiness whether by buying goods perceived as "needed," in consuming calories, or seeking diet-cures, self help and self-improvement. However, the empty self cannot be satisfied by short-term fixes, "with an empty self people *always* need" (Cushman, 1990, p. 604).

Modern consumerism is often seen as the opposite of an environmental ethic. Materialism is defined as placing importance on and being attached to consuming and material possessions.

Self-enhancement values such as power, security and hedonism are associated with materialism. In line with the empty self hypothesis, materialism was also negatively related to satisfaction with life (Sharpe, 1999). In contrast, environmentalism is associated with self-transcendent values which are opposed to self-enhancement values (Schultz & Zelezny, 1999; Schwartz, 1992; Stern, 2000; Stern & Dietz, 1994).

### **Implications of CTN to Environmentally Responsible Behavior**

As a personal identity, interconnectedness with nature is viewed as a central principle of life (Shepard, 1995). An individual's relationship with nature is believed to be the key to peoples' psychological health as well as the health of the planet (Beyer, 1999). Deep ecologists feel that the crux of environmental ills is the anthropocentric view that humans are separate or above nature, having dominion over nature. Therefore, deep ecologists feel that focusing on education, policy change and/or technology is a waste of time. Furthermore, the environmental movement's focus supports the status quo by stressing a more efficient and less consequential domination of nature. Behavior change strategies unwittingly refer to dominion by stressing the instrumental value of nature, moral norms and technological fixes such as efficiency (Beyer, 1999).

Deep ecologists believe these traditional appeals to environmentally responsible behavior (ERB) have been largely ineffective because they ignore the root of the problem – our lack of connection. Shaming or scaring people into action, through ethical appeals and gloom and doom, is ineffective. Such tactics lead to helplessness and shame. This backfires into resentment and avoidance of environmental appeals and news. ERB's then become viewed as compromise and sacrifice, or worse – the undermining of a person's very well-being such as protecting spotted owls while cutting jobs (Beyer, 1999; Dowdall, 1998; Kaplan, 2000; Rozzak, 1992). These views

are in line with what Kaplan (1991, 2000) had to say about the negative effects of stressing sacrifice and incurring helplessness, as well as cognitive dissonance theory.

If there is to be change, it must deal with the problem: humans' relationship with nature. A problem cannot be fixed by only addressing the symptoms. However, when people are connected to nature, they instinctively care for it and act to protect and preserve it. When we feel at one with nature, protecting nature is as natural as protecting ourselves or loved ones (Naess, 1995). "The requisite care flows naturally if the self is widened and deepened so that protection of free nature is felt and conceived as protection of ourselves" (Naess, 1995, p. 236).

Experiences related to feeling connected to nature were explored in the qualitative analysis of several dissertations (Beyer, 1999; Doran, 2002; Dowdall, 1998; Dufrechou, 2002; Martin, 2002; Reist, 2004; Snyder, 1989). Different themes and interpretations were found for each study. That is, there was not a complete overlap in findings. For example, Dufrechou's (2002) primary interpretation was that the experiences were transformational as people experienced grief and healing through nature. Secondary interpretations included feelings of unconditional love when in sensory contact with nature, a restorative experience; a need to live in harmony with nature and a deep connection with nature that can be felt as a spiritual experience. In contrast, Beyer's looked at how people arrived at and traveled through peak experiences in nature. Despite different findings, common themes did exist among the seven studies which are: 1) peaceful and restorative feelings; 2) a deep connection with nature, expansiveness of self and feelings of oneness; 3) an appreciation for nature; 4) awe; 5) a desire to reciprocate or care for nature (Beyer, 1999; Doran, 2002; Dowdall, 1998; Dufrechou, 2002; Martin, 2002; Reist, 2004; Snyder, 1989). These five themes are detailed in Table 2-1.

The qualitative studies revealed a pattern of progression in relationships with nature. With little experience with nature, people did not relate to nature, had utilitarian views of nature and natural resources and had a marked fear or aversion to nature (Beyer, 1999; Martin, 2002; Reist, 2004). Fear and disgust for nature was found for those with little preference for wildland environments and recreation (Bixler, 1994; Bixler & Floyd, 1997). Reist (2004) also found more fear and disgust for those high in materialism. As people gain experience with nature and are more comfortable with nature they begin to care for nature. With more experience, especially emotional or quiet reflective time in nature, care deepens. Finally as care continues to deepen, one becomes integrated with nature, feeling truly connected to nature as nature becomes a core aspect of self (Beyer, 1999; Martin, 2002; Reist, 2004). Martin (2002) calls these stages alienated from nature, traveling through nature, caring for nature and integrated with nature.

These results are similar to what Kaplan and Talbot (1983) found with Outward Bound participants and the findings of a qualitative study of wild animal triggered peak experiences (DeMares & Krycka, 1998). Kaplan and Talbot found a change in perspective, tranquility, enjoyment, fascination and sensory awareness. DeMares and Krycka found five themes: harmony and flow, connectedness, intention on the part of the animal to seek the human, reciprocity of process or a bond, and a sense of destiny. There is also awe, joy, unconditional love and other feelings of being truly alive. Passive activities in forests (non-wilderness) were found to produce transcendent and other positive emotional experiences. These included the diminutive (humility, insignificance, awe) and deep flow (effortless attention, timelessness, oneness, tranquility) transcendent experiences, aesthetic experiences and restorative experiences (Williams & Harvey, 2001).

The accounts of feeling connected with nature from the seven qualitative studies detailed in Table 2-1 included descriptions of an expansion of self-concept – almost as though a new identity was forming. Beyer described it as “an experience of transcendence, connectedness and identification” (1999, p. 269). The experiences included an expanding sense of self, a self without barriers, the melding of the sense of self with nature and an identification with nature and the universe (Beyer, 1999). The experience of feeling connected to nature also seemed to be profound, emotional and life-altering (Keltner & Haidt, 2003; Snyder, 1989). This is also in line with emotional aspects of personal identity (Hitlin, 2003).

### **Connection Summary**

CTN is related to the three value orientations in VBN theory that are representative of the inclusiveness of a person’s self-concept. Connection to nature represents a core aspect of self-concept as it is a personal identity. Personal identity influences values, which influence attitudes, and intrinsically motivates our behavior as we try to remain authentic to our true self (Clayton, 2003; Clayton & Opatow, 2003; Hitlin, 2003; Stets & Biga, 2003; Stets & Burke, 2000; Twigger-Ross, Bonaiuto, & Breakwell, 2003). CTN’s influence on behavior depends on identity salience and centrality (Stets & Biga, 2003; Stets & Burke, 2000; Stryker & Serpe, 1994). Furthermore, connection can be seen as having various levels or stages, such as a continuum from low to high, as there would be varying levels of inclusiveness to self and affective strength beginning at a fear of nature (no connection) to inclusion with nature (Beyer, 1999; Martin, 2002; Mayer & Frantz, 2004b; Reist, 2004; Schultz, 2002). An identity of CTN would motivate people to want to protect the environment in many situations and lead to generalizable behaviors. This is especially the case if connection becomes a core identity, as it should have a large and widespread effect on behavior. Of course, ERB can be likened to other behavioral continuums

such as health behavior. The more you value it or the more central it is, the more behaviors you will pursue.

Of course, a lack of ecological understanding could limit the generalizability of connection for those not completely integrated with nature. There still may be an aversion to some life forms and ecosystems. For example, one may love deer and feel a connection with them but may not understand population and ecosystem dynamics leading to unfavorable attitudes toward managing a population with predators, hunting and other wildlife management methods (Myers & Saunders, 2002; Vining, 2003). Or one may experience close relationships with animals and nature but view some species and ecosystems such as snakes, predators, bats, bogs and swamps as bad, unneeded or disgusting (Bixler & Floyd, 1997). Ecology is often not a required course in high school or college and a lack of ecological knowledge often leads to misunderstanding and misconceptions (Munson, 1994).

There is also the danger that connection coupled with a perception of dire issues or empathy may cause people to become overwhelmed and lead to despair (Vining, 2003). Fear, sadness, pain, anger, guilt and helplessness could lead to psychological defense mechanisms such as denial, rational distancing, apathy, resignation and delegation, not action (Kollmus & Agyeman, 2002). Even the most connected individual can feel negative emotions at the direness and vastness of environmental problems. Ways to avoid negative emotions and their psychological defense mechanisms are needed for behavior change models. Possible solutions include a focus on individual solutions rather than overwhelming global problems, a more positive presentation of issues - not just gloom and doom (Finger, 1994), and to provide the type of information that may serve to increase efficacy and reduce helplessness.

## **Measuring Environmentally Responsible Behavior**

One hypothesized dimension of CTN is behavioral, representing a commitment to (or the strength of) the relationship (Schultz et al., 2004). ERB is often measured as a target outcome variable in studies, that is a specific target behavior such as the amount of water used in a household in a given month. Studies that look at the relationship between specific attitudes and their corresponding specific behaviors, rather than either general attitudes or general behaviors are more predictive of behavior (Ajzen & Fishbein, 1980; De Young, 2000; McKenzie-Mohr, 2000). Research has found little evidence for spillover effects or one type of ERB leading to another and people who performed one type of ERB often did not perform any other proenvironmental actions (McKenzie-Mohr, Nemiroff, Beers, & Desmarais, 1995; Vining & Ebreo, 2002).

Several scales that include a variety of environmentally responsible behaviors have been developed and tested. These include the Environmentally Responsible Behavior Inventory (ERBI) (Smith-Sebasto & D'Acosta, 1995) which was developed for college students and the General Ecological Behavior scale (GEB) (Kaiser & Biel, 2000) developed in Europe. The GEB is unique in that it takes into account the level of difficulty of performing a behavior using a procedure called Rasch modeling. Many times a single, yet difficult behavior such as installing a tankless water heater or riding a bike to work adds up to more benefit for the environment than many small behaviors such as bringing your own mug and grocery bags and recycling. When scales take difficulty into account, difficult items are weighted more so that effort rather than the number of items on the scale reflects an individual's score (Kaiser & Biel, 2000; Kaiser, Wolfing, & Fuhrer, 1999; Schultz et al., 2004; Vining & Ebreo, 2002). However, no scales have been found that take into account the amount of environmental impact of the behaviors.

Another concern in measuring ERB is the validity of using self-reported behavior and behavioral intentions. Studies that have measured both self-reports and observed behavior have found a lack of correspondence. People often overestimate self-reported behavior (Vining & Ebreo, 2002). The advantage of using self-reports is that some behaviors are not observable and self-reports are easy to obtain – especially in terms of a list of behaviors (Ajzen & Fishbein, 1980). Certainly in terms of a list of ERB’s self-reports or intentions make more sense. However, it is always better to measure an observed behavior rather than rely on self-reports (Vining & Ebreo, 2002). Some studies have used both self-reports and measures of observed behavior. Swanagan’s (2000) study at Zoo Atlanta used a survey, signing a petition and returning an opinion solicitation card to measure ERB.

If connection leads to a desire to care for and protect nature, then those who feel connected to nature would be concerned with increasing their positive impact and decreasing their negative impact on the environment. These desires should lead to a higher number of ERB’s, including more difficult behaviors. Therefore, it makes sense to use a general measure of behaviors when studying connection to nature.

### **Conclusion**

Connection to nature shows great promise in encouraging environmentally responsible behavior. Connection is related to self-concept as it is a personal identity, has affective, cognitive, conative and behavioral components, and is often formed by direct experience. Personal identity influences values and intrinsically motivates behavior. Therefore, connection has a potentially large effect on shaping behavior. Schultz (2002) maintains that three components of inclusion with nature (cognitive or connection, affective component, caring, and the behavioral component, commitment) have a linear relationship where connection is the core element that leads to caring and caring in turn leads to commitment..

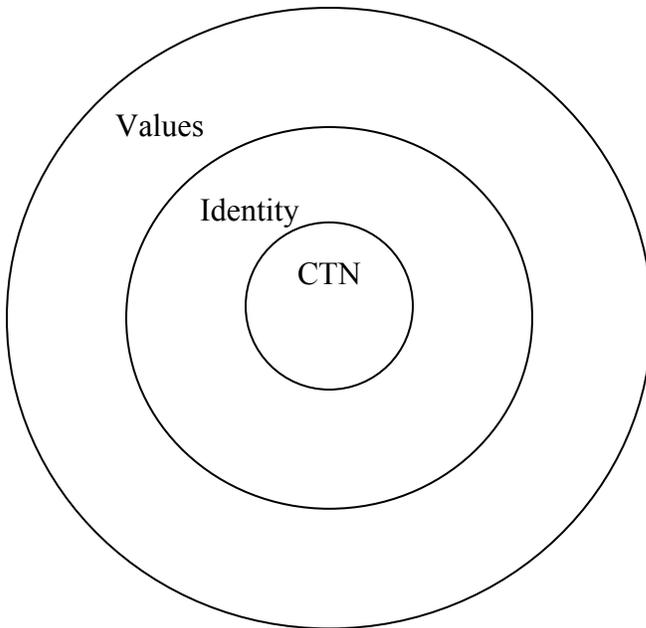


Figure 2-1: Model of chapter organization: The relationship of values to identity and CTN

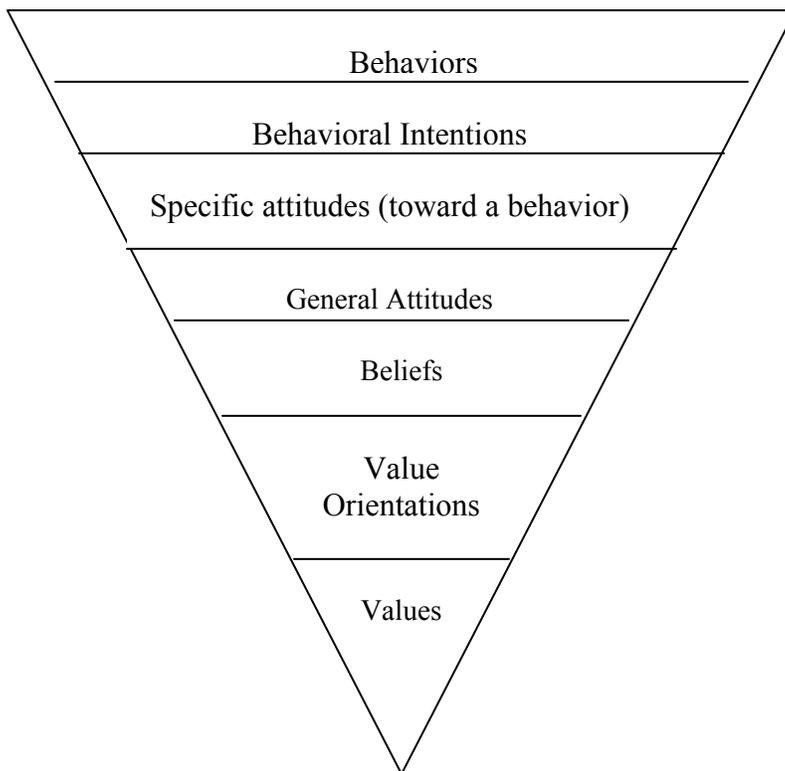


Figure 2-2: Value-attitude hierarchy (adapted from the cognitive hierarchy model of human behavior from Vaske & Donnelly, 1999 and Fulton, Manfreda and Lipscomb, 1996)

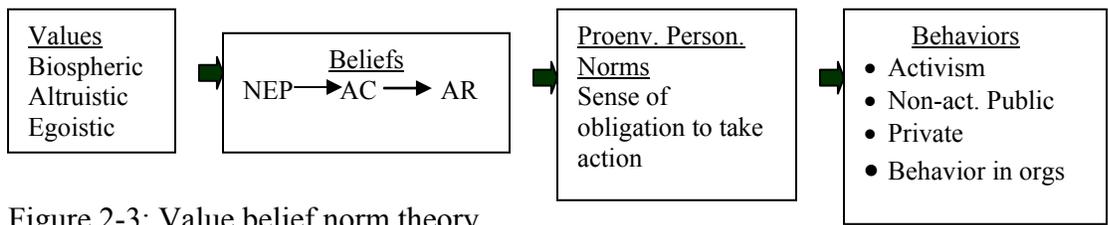


Figure 2-3: Value belief norm theory

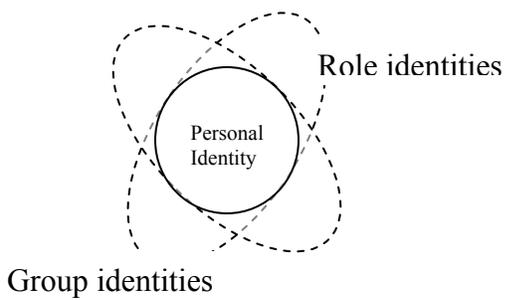


Figure 2-4: Group and role identities revolving around the core self

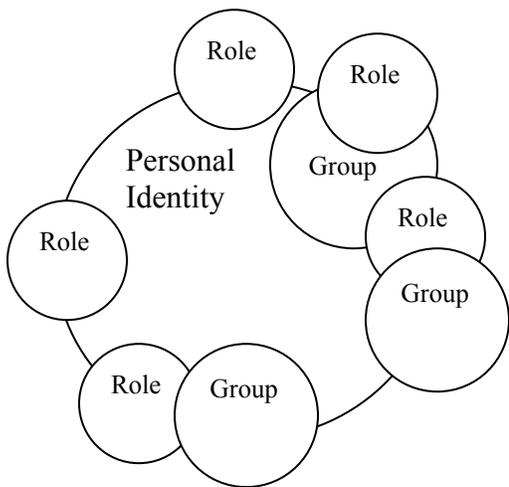


Figure 2-5: Hypothetical model of identity relationships

Table 2-1. Common themes found in seven qualitative studies (Beyer, 1999; Doran, 2002; Dowdall, 1998; Dufrechou, 2002; Martin, 2002; Reist, 2004; Snyder, 1989).

Oneness	Appreciation	Awe	Reciprocity	Restoration	Fear
-Boundaries disappear	-Sensory awareness	-Part of something bigger	-Desire to make a difference	-Safety	-Fear
- Harmony	-Enjoyment	-Awe	-Caring increases for people,	-Peaceful	-Anxiety
- Self is expansive	-Desire to touch	-Wonder	animals, nature	-Stress-released	-Nasty
- Self is inclusive	-Desire to embrace	-Feel small	-Desire to give back	-Relax	-Smells
- Feel immersed	-Beauty	-Indescribable feelings	-Stewardship	-Feel free	-Snakes, bugs, spiders
- Intimacy	-Love	-Miraculous	-Restoration of nature	-Letting go	-Get lost
- Wholeness	-Nature is a friend	-Respect		-Feel nurtured	-Dirty
- Spiritual experience	-Elation	-Truth		-Calm	-Hostile
- Timeless	-Cycle of life	-Cathedral like		-Contentment	-Unfriendly
- Closeness	-Maintenance of life	-Ground shifted		-Reflection	-Abusive
- Connected	-Fascination	-Feel insignificant		-Soothing	-Dangerous
- Part of	-Value	-Gratitude		-Serenity	-Repulsive
- Energy moves through you	-Educational	-Humility		-Need fulfillment	-Abrasive
- Inclusion	-Delight	-Sacred		-Security	-Aversion
- Engulfed	-Joy	-Greater sense of power or being		-Comfort	
- Union	-Happy	-Epiphany		-Rejuvenating	
	-Feel at home	-Inspirational		-Energizing	
		-Feel blessed or healed		-Centered	
		-Feel the power of nature		-Balanced	
				-Clarity, illumination	

## CHAPTER 3 METHODOLOGY

This chapter provides an explanation of the data collection methods employed in this study. A description of the research design, research variables, study population, instrumentation, participants, item development, data collection procedures, and data analyses will be provided.

### **Research Design**

The research design is a mixed-methods study that includes a seven-step process for scale development. The research questions answered by this study are also embedded in the scale development process. A detailed list of research questions and corresponding analysis is given below. The questions are grouped by qualitative and quantitative methods.

#### **Research Questions and Methods Used to Answer Questions:**

##### **Qualitative questions**

1. How do people define connection to nature? What themes are common when people describe their relationship with nature?  
**Method:** Interviews were conducted with purposeful sampling and snowballing to study a diverse group of people that have a relationship with nature. This includes hunters, fishers, backpackers, environmentalists and those of different races and religions.  
**Analysis:** Thematic analysis of interviews looked for common themes. This was done through constant comparison using a metaphorical approach. A focused summary of themes and explanations including examples of each theme is the result of the analysis.
2. What items can be derived from the themes that emerged from the descriptions of connection to nature?  
**Analysis:** All possible items were rated by a group of 15 graduate students at the University of Florida using Thurstone scaling to determine if the items represent the construct. Items were kept or discarded based on mean scores.
3. Are the items and survey understandable?  
**Method:** A small pilot study was conducted with 5 people using a think aloud. Items were modified accordingly.

##### **Quantitative questions**

4. Do the items show good psychometric qualities?  
**Analysis:** Item analysis was conducted on all items that tests item variability, item discrimination, response location, item correlations and item covariances.

5. a) When the items are tested in a survey, do different components of connection to nature result?  
**Ho5:** CTN will be unidimensional  
**Ha5:** CTN will have five dimensions based on previous work (awe, appreciation, tranquility, caring, oneness).  
**Analysis:** Exploratory factor analysis was run using SPSS on half of the data.
  - b) Are the dimensions found in the EFA in Step 5a confirmed with a confirmatory factor analysis?  
**Analysis:** CFA was run using AMOS on the other half of the data. Maximum likelihood estimates from the covariance matrix was used to analyze the independence of the models, their goodness of fit and root mean square error approximations and Tucker-Lewis index.
  
6. Are values related to connection to nature?  
**Ha6a:** There will be a positive relationship between self-transcendent values and connection.  
**Ha6b:** There will be a negative relationship between connection and self-enhancement values.  
**Analysis:** Correlation analysis assessed the strength of relationships among the variables.
  
7. What is the relationship of connection to nature and other variables that indicate convergent and discriminant validity?  
**Ha7a:** There will be a positive relationship between connection and Mayer's and Frantz's CNS scale.  
**Ha7b:** There will be a positive relationship between connection and identity.  
**Analysis:** Correlation analysis was used to assess the strength of relationships among the variables.
  
8. Is there a relationship between CTN and ERB?  
**Ha8a:** There is a positive relationship between connection to nature and environmental behaviors.  
**Analysis:** Regression analysis was used to assess the relationship between CTN and ERB composite scores.

Each research question was answered by a step in the scale development process. Table 3-1 depicts the scale development process with corresponding research questions. The first two steps in the scale development process involve conducting and analyzing qualitative interviews and the development of items that represent the themes that came from the qualitative data. The next five steps involve quantitative methods that were taken to develop the scale and establish

reliability and validity data on the scale. All aspects of the methods used; the research variables, instrumentation, participants, data collection and analysis are described in that process.

### **Overview of Scale Development Process**

A seven-step process was used to develop and validate a connection to nature scale for use in nature-based tourism venues. This scale development process follows suggested psychometric procedures (DeVellis, 1991; Netemeyer, Bearden, & Sharma, 2003; Nunnally & Bernstein, 1994; Spector, 1992). This process is outlined in Table 3-1. Several distinct samples of people were used at different steps in the process. Therefore, as each step is explained, the sampling for that step will be described. Operationalization of variables are also described in each step.

#### **Step 1: Define the Construct**

Although the literature on concepts related to connection to nature has been thoroughly examined, most exploratory, qualitative work on the construct has been concerned with the experience of feeling connected in terms of peak or optimal experiences. There is a void of literature exploring connection to nature as an aspect of personal identity or as an encompassing value. Therefore, this research will begin with an exploration of the connection to nature construct as a value-based aspect of personal identity.

Interviews were conducted with 25 people (11 males and 14 females) from July of 2006 until September, 2006. The average age for males was 34.7 and the average age for females was 36.7. These 25 people included undergraduate and graduate natural resource majors at the University of Florida, people who work in parks and natural history museums, hunters, fishers, birders, backpackers, gardeners and others who are nature-oriented people. Care was taken to represent types of nature orientation and different user groups such as hunters, fishers, environmentalists and those representing different ethnic and racial groups and religious

orientations. Participants were located through the researcher's contacts and snowballing from those contacted. A list of those interviewed is included in Appendix A.

The interviews were semi-structured (see Appendix B for the interview guide) with the interviewer asking questions and elaborating and probing when necessary in order to stimulate the conversation or clarify issues. However, the conversation was not highly structured or controlled by the interviewer in order to allow for a free flow of ideas and interaction. The individual interviews were audio taped and transcribed verbatim. Transcripts of each interview were analyzed for themes using constant comparison and a search for common themes among all interviews. Member checks were employed to ensure the validity of the data. This was done by summarizing responses for each participant and checking for agreement. Summaries were given at the end of each interview. Transcripts, if requested by participants, were sent via e-mail or postal mail, according to each participant's preference.

### **Step 2: Define Domains and Develop Test Items**

Potential items for the connection to nature scale were developed for each of the nine domains identified from the qualitative study in step one (awe, restoration, caring, fear, appreciation, oneness, sorrow, spirituality and identity). Twenty-five to 40 items were developed for each domain.

### **Step 3: Item Scaling**

A sample of 25 graduate students interested in outdoor recreation or natural resources from the University of Florida assessed the connection items providing Thurstone-type judgments for each. Items were rated on a 7-point scale for the degree that each item is a good example of its corresponding domain. Participants did not rate items based on the amount they personally disagree or agree with the item; rather they rated items based on their perception as to whether or not the items represent the domain. This step is similar to having a panel of experts' judge items

for face validity, only, scaling items allows for more systematic measurement. Items that did not receive a mean score of at least 4 were not considered representative of the corresponding domain and were deleted from the item pool. This step was completed during a two-week period in October, 2006.

#### **Step 4: Pilot Testing the Survey**

The survey was pilot tested in October of 2006 with a small group of five adults using a think-aloud. A think-aloud means that participants read the survey while making any and all comments about the instructions and items audibly for the researcher to note. The purpose of this think-aloud was to ensure that participants understood the survey instructions and all items. Areas designated as having potential problems in the pilot were modified accordingly.

#### **Step 5: Pilot Testing the Survey to Select and Revise Items Based on Item Analysis**

A convenience sample of 113 students in an introductory course in the Department of Tourism, Recreation and Sport Management at the University of Florida took a survey that included 90 test items. Items were measured on a five-point Likert scale with responses ranging from “strongly disagree” to “strongly agree.” An item analysis was conducted using SPSS 12.0 that examined item variability, item discrimination, response location, item correlations and item covariances. The results of this analysis were used to discard items that did not perform well.

Item variability assesses an item’s ability to measure individual differences on a facet. This is simply looking at the amount of variability on an item among individuals to ensure individuals respond at different levels. An item where everyone gives the same response is not measuring individual differences. This was done using the variance. On a 5-point scale, variability for items should have standard deviations from .5 to 1.0.

Response location refers to the location of the distribution of the responses to an item by looking at where the majority of individuals lie on the scale. Response location can be measured

by using the mean of the item responses. For good item location, the mean should fall near the center of the item scale, which would be 3 on a five-point scale. Response location is used to ascertain whether an item is detecting individual differences. However, the variance, of the item is more important for Likert items.

Item discrimination determines if individual responses to a particular scale item corresponds to the individuals' overall ratings on the construct. Therefore, an item that discriminates well effectively differentiates between those who are high on the construct and those who are low. Although the best measure of discrimination is the mean-difference index, the item-total correlation index will be used that can be calculated with SPSS. The item-total correlation measures the correlation between item scores with the total scale score. The limitations of the item-total correlation index are that the results may be compromised if the level of measurement of the item differs from interval. Although Likert items are ordinal, they are often regarded as interval for statistical purposes.

Item correlations are used to measure item discrimination by estimating the degree of relationship between the items or an item and the total test score. For Likert items, Pearson Product Moment Correlation is the best correlation method to use. SPSS provides a table of inter-item correlations.

For item covariances, Cronbach's alpha was used, as it is based on item covariances, such that the higher the covariance the higher alpha. Items that are highly correlated allow for higher covariances. SPSS provides a table of summary statistics for inter-item covariances.

### **Step 6: Assess Reliability and Dimensionality**

Data was collected twice in this step. First, 234 members of two environmental listservs (approximately four groups based in both north central Florida and the panhandle of Florida) in Florida took one of four test surveys from December, 2006 to January, 2006. However, this data

proved to have several items that did not work. These items were negatively worded and they failed to perform well psychometrically in this step or the previous steps. The problem items were replaced with items from the item pool that had initially performed better. Next, 532 students in an introductory leisure course in the Department of Tourism, Recreation and Sport Management at the University of Florida took one of four versions of the test surveys during March, 2007.

A large number of scales and consequently items were tested in this step. Therefore, four versions of the survey were used to minimize respondent burden. All four versions of the survey contained the following three scales: 1) 41 connection to nature items measured on the same five-point Likert scale as the pretested items; 2) Crowne-Marlowe (1960) short social desirability scale; and 3) demographic items. A list of survey sections or scales is found in Appendix D. The other scales and items found in the survey included Schwartz's (1992) self-transcendent and self-enhancement value scales, Mayer's and Frantz's (2004) Connection to Nature Scale, the Environmental Identity Scale (Clayton, 2003), the NEP (Dunlap, Van Liere, Mertig, & Jones, 2000), norms from VBN (Stern et al., 1999), adapted measures of identity with nature, identity salience and items asking about environmentally responsible behavior. These additional scales were used for the validation study in the next step. For a list detailing the sections or scales found in each version of the survey see Appendix E.

An item analysis was conducted to examine item variability, item discrimination, response location, item correlations and item covariances. The results of this analysis were used to discard items that did not perform well. Item analysis included item variability, response location, item discrimination, item correlations and item covariances as described above in step 5. An

exploratory factor analysis was run to assess the dimensionality of the scale. Principal components analysis with direct oblimin rotation was used.

**Step 7: Conduct Validation Studies (prediction, convergent and divergent validity)**

Concurrent validity was assessed using Mayer's and Frantz's (2004) Connection to Nature Scale. Convergent validity was assessed using the revised NEP (Dunlap et al., 2000), and an adapted measure of role identity used by Charng et al.(1988) and Schwartz's self-transcendent values. Discriminant validity was tested using Schwartz's self-enhancement values (Schwartz, 1992). Predictive validity was tested using a modified (updated) ERBI (Smith-Sebasto & D'Acosta, 1995).

Table 3-1. Scale development process

Step	Research questions	Purpose	Method & analysis
1	1	Define construct	A. Qualitative interviews B. Thematic analysis of qualitative interviews
2	2	Generate items	Develop 25-40 items per theme
3	2	Item scaling  (similar to face validity)	A. 25 people rate how well items represent the corresponding themes using 7-point Likert scales. B. Means used to obtain a set of 10-12 items per theme based on scaling results.
4	3	Pilot test	A small pilot study conducted with 5 people using a think aloud. The purpose is to find out if the items and directions make sense to people.
5	4	Item analysis	A. Pretest the items chosen from the scaling with 100 people. B. Conduct item analysis of the pretest items. C. Throw out items with little variability, extreme means and low item discrimination (item total correlations). The goal is to have a parsimonious group of items for each domain. D. Choose items for scale based on pretest results.
6	5 & 6	Assess reliability and internal structure or dimensionality	A. Reliability analysis B. EFA C. CFA
7	7-9	Validity tests	A. Test convergent, discriminant and predictive validity of scale by testing relationships with the scales of other constructs.

## CHAPTER 4 RESULTS

This chapter reports the results from each step in the process of investigating CTN and developing the CTN scale. Therefore, this chapter is segmented into sections associated with the steps outlined in the previous chapter.

### **Results from Step 1: Define the Connection to Nature (CTN) Construct**

Twenty-five adults were interviewed, 11 males and 14 females as noted in Chapter 3. The interviews were semi-structured (see Appendix B for the interview guide). The thematic analysis resulted in nine themes detailed below.

#### **Tranquility/Restoration Theme**

This theme is characterized by feeling peaceful and calm when in nature. Many people seek out nature and natural areas for tranquility as well as the mental and physical effects derived from being in tranquil settings. After spending time in nature they feel rejuvenated, restored and refreshed, as if much of the anxiety and tension that characterizes their lives is washed away. Some felt that water, either hearing water or being in water, was the most tranquil and relaxing of natural settings.

Nature is seen as an escape from a fast-paced, busy and stressful life. For example “it’s like an escape from everything else that’s around me” (Miguel); “it’s a way to get away from the daily grind.” (Emma); “an absence of anxiety” (Luke); “you’re away from all the hustle and bustle of everyday life” (Hannah); and “you’re away from all the stress and you know and the, the chaos in everyday life” (Rosella).

Many people found certain aspects of nature particularly relaxing. For many this aspect had to do with sound, either the lack of noise or certain sounds found in nature. “You get to listen to all the sounds” Hannah; “if you listen to the wind going through the trees than it helps to

calm your mind” Joe; “just kind of taking everything in and enjoying the quiet” Joe; or “it’s really peaceful. You know that you don’t hear the cars like you do here or the sirens, it’s so quiet.” (Lucy).

Eva explained the effect of sound well when she said, “I think it’s a sense of um calm for me to come out and sit in the area and just listen. It’s um you go inside and of course we don’t have television as you probably know and that to me, I go to work and I hear the television and I hear things and it’s um makes my mind unclear. It’s so much going on and I come home and I can be outside and if we go for walks. And we don’t even talk we just walk out in it and it’s quiet and it, it clears my mind. And it helps me, helps me relax and I guess for me it’s kind of um...helps me clear work and it’s just an outlet for me, being outside. I guess.” Even for young people who aren’t yet in the stressful world of work, whom adults think of as enjoying loud music and noisy, busy atmospheres, quiet in nature is still important as Amanda explains, “real peaceful and just, I was able to let go of what was bothering me. Um able to think, I was able to clear my head and really think about things. Cuz it’s quiet and there isn’t a bunch of added extra noise or people.”

Others mentioned that they found water particularly relaxing. Water was relaxing whether listening to running water such as a stream or fountain, looking at a body of water, swimming or being in a hot springs. Allen stated, “Swimming or just sitting in water. The water is very rejuvenating. And if it’s water with a flow like a river, it’s incredibly rejuvenating, incredibly relaxing. Just being near waterfalls I think is relaxing. I think water has a relaxing way about it.” Breanne found, “spending time in the natural hot springs and just decompressing and letting the water uh purify and um and you know wash away tension um that is really amazing.” One person

described how nature and in particular one experience sitting under a waterfall felt rejuvenating, as if his energies were being recharged, “kind of um decompress and recharge energy and stuff.”

Nature was also sought out when stressed, tense, sad or depressed as a way to feel restored or to feel happier. “Sitting in my back porch watching birds eat suet for me is uh you know very relaxing, it’s very restorative.” Rosella said, “when I’m depressed I think that the, that there is a way to reconnect back to that feeling just by being out in nature again. And that would help you a fight you’re your sad feelings or depression.” Nikki who’s from Eastern Europe told me, “Well what we uh we used to do when we were kids, I don’t know if people do it here. Like if you feel really upset and stressed you go to the tree, usually it’s a birch tree and you just hug it. And you stay like this for a while and it helps you, you feel better after that.”

People also reported using past nature experiences as a way to feel peaceful or even to relax during a stressful situation. For example, Jack, “I don’t know but um if you’ve spent much time underwater, snorkeling or scuba diving, you’ve only to close your eyes, and you can go there again and feel like that. And I do that everyday for months after I’ve been snorkeling or scuba diving. I just kind of relive it. And that helps out in your everyday life because it’s complete stress relief.” Breanne expressed something similar in saying, “I can very easily imagine myself in some of my favorite places in nature and it immediately helps me to relax or focus um if you know stressful situations are around me. I mean, so it’s not just in the moment, it’s also something that carries with me too. So it’s something that never goes away.”

Finally, several people felt that without nature they would be more tense and in a negative mood more often. Eva said, “if I didn’t have this around I think I would be a lot more stressful. I think I would have, it really relaxes me. So I guess it does change who I am. I’d be more tense and um probably not so nice of a person.” Debbie says without nature time “You do get stressed

and then you start snapping at people . . .” and Carlos thinks he’d, “probably get a lot more moody though. I’d find it a lot more difficult to just get through my day to day.”

### **Awe/Marvel Theme**

Many reported feeling a sense of awe when viewing aspects of nature. Many times this involved great beauty, grandeur or power such as thunderstorms. But for many people this also involved everyday aspects of nature such as watching insects, lizards, birds and other wildlife. This dimension involves a sense of wonder when enjoying nature and even a childlike curiosity. Feelings of awe were often intense and described as emotional and even overwhelming by several people. A sense of humility at how little we know, feeling small in a large universe, feeling fragile and vulnerable were also part of this theme.

Emma described awe inspiring beauty when driving home from work, “When I’m coming home, and I come up over the hill and I see the valley of Simi Valley before me. And it, it’s like, and the sun is starting to set or just set and there’s all these different beautiful colors that you kind of associate with the desert. You know the purples and oranges and you know the sun reflecting off the rocks, or the colors in the sky. It’s just amazing. Truly amazing.”

Beauty in nature not only inspired awe but deep emotions “If I’m in nature, the deep emotions just can be sometimes the beauty.” (Allen). Miguel described the emotion he felt from driving through the desert, “And I got a chance to just drive and just, just go through you know, just see sceneries that I had never seen before. And I think that really, really, really affected me in the sense that something, you know things we had something that, that, that beautiful in our country. It was just breathe taking. Its just stuff that you can’t, I mean every picture that I would take looked like it was a postcard. I mean it just looks fake.”

The emotion inspired by natural beauty was described as overwhelming, Rosella said she was often so overwhelmed by the beauty and grandeur of nature that, “I cry from emotions from

happiness when I see something that is really uh striking in beauty. When I first saw the Grand Canyon I cried. And when I was in the Himalayas, I cried. I cry, I cried when I was in Arches National Park, Bryce Canyon. I mean this were all very, very I feel the massive, majestic presence of a, a something higher than us. And it just a, I'm just like overwhelmed and I cry with joy. Yes.”

Awe was also felt when looking at animals, “it’s amazing. There’s actually critters like that out there that you actually see.” However, even animals people see everyday inspire awe when observing and noticing certain things about them, for example Allen said “Even today I saw two lizards run out and eat insects and I thought that was pretty amazing. And I saw a cowbird eat a lizard. A cattle egret. I think that’s nature and an amazing experience.” And Joe said, “Almost on a daily basis. Um, I don’t know I just get excited over seeing, out where I live I see deer all the time and every time I see them I get, I get you know, I’m in awe of how they jump. It’s just amazing and um I don’t know I just see beauty in a lot of things in nature and I’m always in awe of different aspects or quality, or qualities.”

Awe was felt as a type of bewilderment or astonishment as Miguel describes, “Yea. It’s like this feeling of awe that you’re just like, ‘I just can’t believe it!’ So yea I got that with uh, with the Grand Canyon I got that. Um I just, I just couldn’t believe it. I had no words to explain it other than just take pictures and hopefully *laugh*. I never get that experience in the city. There’s nothing that you know you can even see a car chase and there’s no awe in that, it’s just, ‘OK, there’s car chase.’ You know.”

Hannah also expresses bewilderment from seeing springs, “OK, the coolest thing about nature that I’ve seen is right here in north Central Florida. I went to High Springs and they have these springs. And that to me is the most amazing thing because it’s all natural. Have you been

there? And you look at it. The water is so amazingly blue and then there's caves and stuff! It's so awesome! It's so awesome to me, how, how that happens. Like, how does that even happen? And they're all like connected to each other. And the water is just, it's beautiful. It's, it's the most beautiful thing I think I've almost seen in my whole entire life. It just blows my mind every time I see it. I'm like, it amazes me. And then I'm like, 'How did this even become?' I mean you know what I'm saying? I mean how did this even happen? It's just so awesome."

Although this type of astonishment happens often with the Grand Canyon, just seeing something different will cause these feelings as Amanda describes. "Um, most of the times in awe of what I'm seeing. Going from Tallahassee to even Appalachian Mountains is a big jump. So then I guess going to the Rockies out west, it's like I, or the Grand, places like the Grand Canyon or Bryce you're just kind of like 'where did this come from?' 'How could it be this different here?' 'How could things be so different even if you just drive like 5 miles?' Hmm."

A sense of wonder was often described. This included a sense of how simple and yet complicated nature is all the same time. This type of awe was even felt when reading about nature. For example, "It's just really, really impressive and simple at the same time." "And in those moments *fast & louder* I'll also notice how complex things like, how complex the environment is. How like every or a lot of things depend on one another and just kind of like eye-open, eye-opening experience." And "There's just, uh like, experiencing the like complexity and simplicity behind like some of the things in nature is very like um filling you with wonder and awe."

Many people said they felt humility in nature. Humility was described as feeling like a very small cog in a big machine. For example, Don said, "like human, myself, or even the whole human society just a small piece of the something very big." This was often felt when stargazing,

for example Joe described, “When I look at the sky and the stars and I think of how small the earth is and I think of how, how small I am on the earth, you know you feel very insignificant.” Feeling small also meant feeling vulnerable as described here by Allen, “Yes, you can feel small. You can feel vulnerable. Certainly just like the rainstorm that I said there was awe, there was an experience where you feel awe and you feel vulnerable and fragile. Anything can happen. I’ve crossed water, I’ve crossed rivers on logs, you always feel, you can easily feel fragile.” But perhaps Amanda described the vastness of the universe well when she was standing on a mountain, “Well, I took this hike one time to the top of this mountain and you get to the top and you can see like miles and miles in like every direction. And at that moment you stand there and you think ‘this is just, I’m like this big (*hand gestures*) and I’m standing on top of this mountain and this mountain is just one mountain in this entire range, in this entire country, in this entire world.’ And if you think about it, like that you’re pretty damn small and it makes you feel kind of insignificant to like the rest of what’s going on. Or you can never even imagine what all is going on, every single thing that’s going on, I don’t know.”

Humility was also often felt when thinking about the enormous amount humans do not even yet know about nature and how little we really understand. This is illustrated by Luke when he said, “Every time I go outside I, it’s very humbling and it’s you know and it fills me with uh a sense of humility and, and the fact that there’s so much that we don’t know. Just from a science standpoint and from a, you know kind of metaphysical standpoint and, and there’s so much we don’t know and there’s so much to learn.”

Thunderstorms, and the natural power they represent were also found to be awe-inspiring and several people reported enjoying watching thunderstorms. Liz felt awe from “thunderstorms,

even tornados, which I've never actually been in one but I like to go outside and watch cuz it's pretty awesome." One person even described thunderstorms as a show.

Finally, the miracle of everything that transpires before us and what makes life possible, as well as the miracle of birth, inspires awe. For example, Pedro felt a great deal of awe when he witnessed a manatee giving birth, even though he had seen manatees before and animals giving birth before. Pedro, "But um never, never like that. I never, ever it was like you know like 'Don't' you know like 'get away from her' cuz it happened so fast you know then suddenly you know you see the, the, the aperture start opening and *vroom* and you got another manatee there! Right there are two you know you're like yeeaa. That was cool, that was very cool."

Luke stated, "Ah you know every time I go outside I feel awe. You know when the wind blows I feel awe. When the sun comes up and goes down it's like you know this is uh, this is the real deal, this, this is life, it doesn't get any better than this, you better enjoy it and, and you know always fills me with awe. It fills me with awe to know that all these little insects are cruising around, all these little animals are cruising around which essentially we know nothing about and they're in our own backyard. And you know even when I'm doing this interview, I'm watching these little flies book around these plants and they're interacting with one another. I have no idea what they're doing. But you know it's obviously something really important in their life cycle and uh and how could that not fill you with awe."

### **Appreciation Theme**

A sense of appreciation for nature ranged from those who understood and appreciated our need and dependence on nature to respect and admiration, to those who felt a profound reverence for nature. Nature is appreciated for providing leisure opportunities, interest, learning, beauty, sensory stimulation and joy. For example, appreciating nature for providing an opportunity for

learning is noted in these statements, “the opportunity for discovery. Some cool bug that I hadn’t seen before or some bird that I hadn’t seen before. (Emma)” “seeing the birds interact.”

Nature is appreciated for being a “great source of joy and beauty..(Breanne),” that “just makes me happy (Nola).” This appreciation for nature was also felt to have a positive influence on the person, for example “It makes me have a greater appreciation for life, makes me more of a positive person, when I can be around it (Lou).”

Appreciation was also tied to sensory experiences and for many meant a way to be more appreciative and happy with life. Participants stated that time in nature made them “appreciate a much uh a much larger picture than just my little life,” and “appreciate a life more. (Rosella).” Ned said, “you know I guess it would have to be appreciation of, you know, waking up in the morning...you just wake up in the morning and you’re just like, ‘pew, breath in,’ you know fresh air, it’s trees, ya know you look at the sky, you listen to the birds.” Ned also stated, “You just have to really take the time, like I said before, to want to stop and look at it and actually appreciate it. But it’s there, it’s for all of us to admire and look at, you know to commune with if you will. But if you don’t take the time to do it, how can you appreciate it?” Similarly, Hannah stated, “I appreciate it more I think than others. You know some people really don’t appreciate nature like they should. Like I love going out to UF and watching the bats fly out and stuff like that.”

A deeper appreciation was described as having gratitude and reverence for nature and seeing nature as ideal. For example, one subject Breanne expressed her gratefulness and reverence directly in the following statements, “(I) receive so many things from nature that I’m very grateful” “you know feel privileged if I see a bird fly by me” (Breanne). She feels “a deep reverence and um, really profound uh gratefulness that there is, there are these beautiful places

and creatures and things to be experienced.” (Breanne). Two participants described nature as the ideal way to live life “when I’m uh you know having a natural experience when I’m out snorkeling or something and in another world. I always think the same thing. This is what life is supposed to be like” (Jack).

### **Oneness Theme**

A connection to nature implies a bond with nature and a relationship. This was often described as feeling that they were part of nature or nature was part of self. Some described nature as a friend and others described it as a personal and hopefully mutual relationship. The more connected to nature a person feels the more dependent they also feel. That is they must have nature in their lives in a significant and prominent way in order to be happy.

There seemed to be levels of feeling connected to nature. It seemed hard for people who like nature, but don’t have a deep relationship to say they are one with nature. It was easier to describe feeling part of nature and yet even easier to describe feeling connected to nature. Perhaps this deals with a tendency we have to place ourselves separate from and above nature. That is, it is one thing to admit that you like nature and therefore have a connection to it, but quite another to say that humans are a part of it. And yet another still to say that humans and nature are the same, that we are one, even though humans are mammals and cannot be separated from the world we live in.

These degrees of separation were described and/or illustrated by participants. For example, when asked if she has ever felt one with nature, Debbie laughed and asked, “Did you make these up?” Jack said, “Well I feel part of nature in the grand scheme. I don’t feel like I’m at one with nature, you know like the crying Indian in the commercial, I’m not at that level.” But when asked if he felt connected, Jack said, “Yes, I feel connected to it.”

Those who feel one with nature, had examined the pervasiveness of feeling separated from nature. Allen, "I feel part of I don't know if... and to some extent I feel one with nature, you know not as one as I should be. There is certainly a separation between human life and nature but we are a part of nature." Joe said, "But uh also human things are nature too. I mean we may think that these buildings and things aren't nature but we came from nature and we're part of nature we just in our society say that we are uh separate a lot of the times so." Luke, "Uh but I, I think that our artificial existence you know we live in air conditioned homes and we drive air conditioned cars, and, and uh it makes it difficult to be you know truly intimate, intimately reliant on or a part of the whole scene as maybe Native Americans were uh or something. I mean even just down to the very fact that we always wear shoes around, right? So we're, we're literally disconnected; we don't even touch the ground. Uh we have a rubber sole between us and, and the earth. So, you know all those things kind of play into it."

Some described feeling part of nature as fundamental or innate. Breanne, "Um, sometimes it's hard for me to understand how other people can't see it that way *laugh*. You know, because to me it's one of the most simple, fundamental things. Is that we are part of nature. There's no way you can separate humans from nature. Um and that really, the, the process of separating humans from nature is one of the most destructive things that humans do. And it's not healthy for nature or for humans in my opinion. *Laugh*" Allen, "Besides providing us with us the resources of life, it also provides us with an outlet for something that is you know somewhere deep within us, it's a presence. You know, back in time we were certainly one with nature years ago and I think it's still deep within you, you want to be a part of it not just as a relaxation, as a spiritual release, besides the fact that it provides life and resources."

Having a connection to nature often meant having a desire for daily contact with nature. For some this means living in the country and commuting to work and for others this meant daily nature time such as sitting outside during lunch or taking daily walks, communing with nature in some way or even in the way they start their day. For example, Wilma, who lives in the country, said simply, “I always want to be close to it.”

Several people also described that work or the locale where they find themselves, such as in an urban area, keeps them from experiencing as much nature as they would like. Emma, “Right now I’m living in an area that I wish was more natural, that I wish had more trees, more wilderness. But someday I’ll go back to that. Um...I’m not as interconnected with nature now as I have been in the past, especially when I was a young you know child or you know or even a young adult and unfortunately you know life happens so you kinda have to do what you have to do but I plan on returning to a natural way of living later on in my life.” Allen, “But unfortunately with work you don’t experience as much as you like. But I think it’s beyond duties beyond as family, it’s what I’d like to be doing number 2, being involved in nature.”

Some report needing to be away from the city and everyone to feel connected. For example Nola said she feels connected to nature when she’s around it, “Oh you know if I’m in an environment, if I’m in the redwoods, if I’m at Yosemite, if I’m skiing; when I’m, when I’m involved in an activity that puts me in the center of nature.” Amanda said, “Um when you’re away from the city or a majority of people and you’re out in nature um just listening to different sounds or looking at different things makes you feel connected or makes you kind of gives you like this full feeling of there’s something special here.” And Eva said, “I think I tend to more when I’m away from like city life. When you’re out in it and you’re just alone out in the middle of nowhere and you haven’t seen people in a couple of days. I think I’ve experienced it then. It’s

you know just um being completely removed from society. That's probably the only time that I've felt that way."

However, others, especially those who feel more of a natural connection to nature, seem to find a way to experience nature even in very urban areas. Ned for example, who lives in a large city, connects through his senses everyday. "Love honeysuckle, love fragrant viburnum, love tulips. You know there's so many different smells and it just. Right there I'd say that's connection with nature you know. When we smell things, when taste things, when we see things..." Breanne also described feeling connected to everyday nature through her senses, "And where I can really feel connected to each of the things that I'm experiencing; each of the things through my senses, through my sight. You know I can feel connected to the wind that I feel, I can feel connected to something through smell. You know it's all um through my senses as well that, that there's the connection."

For those with a deep connection, even small and seemingly insignificant events can relay a connection to nature as Luke described here, "But um you know last night, I sat in my backyard and I watched a snail interact with its environment for probably twenty minutes and it was very interesting. And you know I really enjoy those types of intimate uh moments where I can really kind of become a part of a greater understanding."

Although feeling connected to nature was described as an overall relationship with nature, several people described situations where they experienced feeling one with nature. These experiences were often described as very meaningful; in fact they were often described as their most meaningful nature experiences. The experiences were often unique, powerful and even overwhelming emotionally, as Allen relays, "and it can be overwhelming that way almost a love or definitely a love."

Nikki described a connection experience she had, “When I was um, we have uh family, we have relatives in the they live near the Vulga River right in the bank of the Vulga River. And they have like gorgeous like this a they call them mountains but they not really high mountains they’re covered with trees. And they have a like a part of like one rock that stands out and we used to climb you know up there right to the top. And just sit over there and watch you know all the what’s going on down. And uh that was amazing experience and you felt like you were part of nature, like all the trees and you are the same as they are, yea. *Laugh.*”

These moments where a deep and profound connection to nature or oneness with nature is felt were described as losing a sense of self. Joe explained how he feels this way, “how would I put that into a feeling? Sometime I guess commune, um communing with nature. I guess you kind of feel um as though you lose your sense of self because you are ...you see all, all of the energy interaction going on around you and, and you just. If, if you really get into a state where you can sit in the woods and, you really start to view everything around you as, as living and being of um spirit.”

Some cultures seem to have described this phenomenon of feeling one with nature. Don said, “Umm, I, I don’t know maybe but from my cultural background in Chinese we describe something if you’re nature you feel lost yourself?” “but lost the feeling the sense of yourself.” Don describes such an experience that he had himself, “Um, one spring a friend and I went to a kind of national or state park. We together and we um kind of lost in those mountains. That’s uh yea, a large piece of forest and mountains and uh it was quite dangerous because suddenly it began to like lightening and raining. And we, we have to decide whether we should go ahead to, to the peak we want go or we should back. And I, I think um and suddenly it began to rain very heavily. And then I realized that I kind of lost control of myself. In, in that, that situation I lost

track of time, lost track of myself and in the rain we, we climbing up and down to, to the peak. I think that's the, yea that's the most meaningful time for me." "Yea, I, I, I feel part of the nature, I lost track of time, I didn't realize I'm there (Don)."

Carlos, who has studied people's relationships with nature, found that the way the Japanese culture describes feeling one with nature fits how he feels. Carlos explains it here, "It's just saying when you've been able to become in harmony with all the elements of nature, you're able to kind of um destroy all the walls you've put up that separates you from living things. And it's just kind of this state of being able to just kind of connect with everything; this feeling of part of everything."

### **Sorrow/Regret Theme**

Those who appreciated nature and especially those who felt a connection with nature often experienced sorrow and grief at the plight of our natural world. Some described how destruction of nature was depressing, made them cry or induced anger and frustration. Often those who felt sorrow for the wild often also felt some remorse over their own impact, wishing that they could live in ways to lessen their impact and be more in harmony with nature.

Seeing natural areas cleared for development was often a source of sadness. "You know you hate to see them cut all the trees down out there," (Lucy). This sadness was often felt deeply as sorrow and grief like described by Breanne, "a deep emotion that I have about nature is great grief for what I see that happens to nature and what humans and you know, have done to nature." Emma also expressed sorrow directly when she said, "I feel sorrow, because of the rate that we're destroying it at. And the majority, I would say the majority of people's attitudes toward nature, they just don't really seem to care or know how important it really is to us."

One participant, Pedro, was involved in the cleanup from an oil spill along the Puerto Rican coast. Pedro described it this way, "That, you know that was kind of sad. I was kind of as

close to traumatic as can get for me you know because you know. It shouldn't happen, never."

When speaking of the spill Pedro mentioned that it was just a small spill, nothing nearly as big as a much larger disastrous spill like the Exxon Valdez. The Valdez spill said Pedro, "Oh, that was amazing, if I had been there I probably cry all day."

Like Emma who was quoted above, many expressed how they felt about other people's lack of caring as they found the attitudes of people who don't care upsetting and even shocking. For example, Jack said, "my shock at other people's nonchalant attitudes about everything that destroys nature." Although at times participants seemed to think other people's attitudes stemmed from a lack of knowledge, many times it was attributed more to greed and or a lack of caring. For example, Miguel spoke of the exploitation of resources, "whenever I start to hear things of people wanting to destroy nature just for its resources and they're not thinking of the long term impacts of it, it, it upsets me." Jack seemed to think people just don't care, "where others don't, or they want them resolved a different way or they want them ignored like global warming or anything else. Or you know some people just want to not, sweep it under the rug like it's not happening."

Fingers were not just pointed at others, several participants said they were concerned about their own impact, feeling guilt and wishing to do more to lessen their impact. This makes sense in terms of any connected or loving relationship. You want to protect the loved one from harm and you want to contribute to their betterment. Breanne said, "And even sometimes thinking about how my own impact on the environment is somewhat, somewhat unavoidable, you know I don't just live off the land, and so I have regrets and I have sorrow for that."

Miguel expressed regret also and acknowledged how Americans share a larger part of the blame than others. "I think it was more of uh an understanding that I can actually damage nature.

I probably do it at a much greater degree than there are a lot of individuals so I have to slow down. So uh in the world you have to at least work with it at least a little bit. So um I realize our lifestyle generally as Americans um or people that live in America, is one that damages the environment much greater extent than you know most other countries.”

Anger was also felt and directed at specific situations and people. Pedro expressed such anger here, “But if it’s uh somebody that did something you know like that Exxon Valdez or something like that, yea I get angry. I get upset, very. When I hear that Pombo whatever idiot guy, who want to put signs in Yellowstone to help the economy whatever right. Sell Alaska, half of Alaska for oil drilling. You know to me that make me mad. I want, a, you know 5 minute with him.”

For Luke, sorrow was so deeply felt that it characterized his relationship with nature and was one of the primary feelings he had toward nature. Here Luke describes the heartache he feels, “but it is also, I would say, a very sad relationship. Uh, you know when I look around and see all of the development and you know I see dead animals on the road, it’s, a, it’s very heartbreaking for me. And it digs at my very existence and my soul. And, and so my relationship is a sad one um because I think nature’s is in major, major trouble, uh globally speaking and locally speaking.”

Unfortunately for some their sorrow and anger is turning into or has turned into despair and hopelessness. It seems to be going that way for Luke as noted here when he talks about one of his two major feelings about nature, “One is just utter sadness at what’s going on. Just I can’t even believe that humans are involved with what they’re doing, it to the planet and to the, the animals. I mean you know you look at for example, lowland gorillas and chimpanzees; these guys are just like us. They’re just like us—very, very little diff, few differences in terms of their

social make-up and their interactions with each other. And we're killing them left and right. So it doesn't really give us much hope for you know saving the uh yellow you know spotted toad in some obscure forest. Uh you know we can't even save the critters close to ourselves. So that's what makes me very sad.

Lou has reached such a point of hopelessness that he has stopped doing most caring or conservation behaviors because as he explains, "It's pointless. Beyond hopeless, it's just pointless. It's beat because it's sad and irritating and tragic that we're fucked. We can go through the motions and even if some people try to change it, it's too late. We just devour everything. So we can either live in a rice paddy or live in the city and devour. Not everyone cares about the consequences and so much is just gone forever."

Finally, having interests different from the mainstream of society, especially if those feelings seem to relate to sorrow for what society is doing, can also lead to inner conflict. Breanne pointed out how her feelings toward nature even make her feel different from others, "And I'm still learning about what it means to be in this relationship with nature. And I think there are still things I can do better. There's still things I wish that I did differently um or there's circumstances in our society that I wish were different that facilitate me um...leading a more quote unquote natural *laugh* lifestyle. And that can mean many things. Um it's just it seems as though a lot of times the greater society is going in the opposite direction of being more connected with nature. And so it's a real struggle wanting to be, in the world, but also having feelings that are different than a lot of people. *Laugh*. Um, yea um you know I don't think that I would solve anything running to the forest and just abandoning the rest of the world.

### **Caring behaviors/Reciprocity Theme**

People often mentioned a desire to care for or help nature and to lessen their impact on nature. Specific caring behaviors were often mentioned. These ranged from feeding and helping

wildlife to energy conservation behaviors, green purchasing, voting, recycling, reduced consumption and other conservation behaviors. The more connected people were with nature, the more of these behaviors they performed and the more conservation was in the front of their minds. Furthermore, it seemed that those with more education, and especially those who had taken an ecology course, performed a wider range of behaviors associated with helping nature.

The most common behaviors mentioned as reflecting participant's relationship with nature were recycling, energy conservation and littering. For those who had not had ecology; not littering, recycling and feeding or helping wildlife in some way was the majority of the behaviors mentioned. Examples include, "Well we don't throw trash out the windows. (Lucy); "I mean I would never litter in a, in a, the nature or do anything that is harmful. (Nikki); "I mean there are things like I don't kill the spiders. I let them out." (Liz); and "like if the hummingbird feeder doesn't have food before I leave, I really, I make time *laughing* to go get them something because they are very upset. *Laughing still*. Things like that." (Debbie).

Littering and feeding or helping wildlife were the only activities mentioned more by those who had never had ecology than those who had. However, people were not prompted by asking specific activities and respondents likely did not recall every activity that they perform. For example, when exploring my own thoughts and feelings, I did not recall every behavior at that time. Furthermore, some of the interviewees had been observed performing more behaviors than recalled in the interviews. It also could be a difference in perception. For example, several participants who feed birds did not mention this. It could be that feeding birds by the ecologically minded is not considered a helping activity. Rather it is an activity that benefits the self more than nature by bringing wildlife into view. Littering is another activity that was not mentioned by many who listed a range of behaviors and who feel connected to nature. This could

be because not littering is so fundamental, that it would not come to mind. Rather behaviors that are more of an effort or more consciously thought of as helping were discussed.

When asked if any behaviors were influenced by their feelings toward nature, several of those who had a firm grounding in ecology and who felt connected to nature went through a list of conservation behaviors. For example, Luke, “Yes, it does. I would say to a fairly large degree. Uh, you know, I’m kind of a freak about um energy conservation, uh turning light bulbs off, using compact fluorescent bulbs. I try to ride my bicycle as much as possible or a high mile per gallon motorcycle. Um, uh I compost. I recycle. I’m adamant about those things. I try to buy fruits and vegetables that are grown in the United States if not locally. Um I try to buy organic um fruits and vegetables. I am a vegetarian which is largely due to ecological reasons and, uh so all those things kind of play into it.”

The motivator for conservation behaviors was the relationship with nature and the feelings toward nature. Jack, “Because I care about it; I know what, about a lot of the issues and care about how they're resolved.” Allen said, “I think if you’re concerned about nature that’s why you would conserve, that’s why you would look at nature, that’s why you’d have feelings for it, like I said the fragility and the expanse and the greatness of nature, if I didn’t have these feelings I wouldn’t feel that way and I wouldn’t act this way.” Joe who is Native American religion is Earth-based, described his motivation in this way, “when I’m praying or if I’m making an offering to the earth I make a pledge that I will um do all that I can to protect, to protect her.” This motivation can be so strong that people will take recyclables to places where they are accepted—either to other buildings or “Bringing things home from work in bags to recycle it” (Eva).

Breanne's relationship inspires not only conservation behaviors but a desire to learn and teach others, "That I have that um desire to give back to nature, as in any loving relationship there's a give and a take and a learning and a growing together and I feel that um I tried to learn as much as I can about nature from nature so that I can than teach others." Carlos, spoke of this desire to give back and to educate others as well, "Um so again symbiotic because I try to actually give back because it's something I don't just kind of sit there and you know recharge my energies without ever trying to put anything back. I actually put in a lot of effort in trying to um again do environmental education, uh make people more aware of things that they do that impacts nature. Um try to see if there's any way to be able to um remedy them to mitigate the impact."

The desire to inspire and teach others about nature was seen in others who feel a connection to nature. Rosella, who is not involved in education for her career said, "And a in my own world my own little way in a, in a try to influence other people . . ." Ned also talked about influencing others, "I do. I would, well I would say small things. I recycle. I try to tell people, 'Hey, you know turn the water off' you know 'click your lights off.' You know things like that. You know I'm not thinking as far as much as you know you got to pay that bill, but I'm like 'hey, you know think of that water, think of that electricity. Please don't litter.' You know I'm a big advocate of *Laughs* this may sound silly but any six-pack ring holder that comes through the house I'm the one who cuts it up and pitches it. You know I'm just like that."

Several people spoke of how they hoped to have more of a positive impact for the environment in the future. Pedro who's a Ph.D. student said), "I know I can be more active or more advocating that. But right now is not the moment for that. When I'm done and I finish and I be a professor than I will have a more powerful voice hopefully. I maybe you know go to (where

I am from) and OK this is wrong, this is right . . .” Others just said that they wished they could do more. For example Eva said, “Um, I wish that we could be out in it more. I wish we had, I think (my husband) and I probably both wish we could have a job where that was our 24-hour job and we could do something more. I, I know by teaching I think that’s his, his thing. I, I wish I had a job where I could be out and, and work more close, um God this is a hard question too. Um, I wish I could do more. I wish I had the background or the education to do something different and to this field. But as it stands now, I mean working more with the, the human side of it. Um, there’s really not. I wish I could do more, I wish did more.”

Many who were connected to nature and who had an understanding of ecology described having an environmental mindset. Allen said, “You know daily I think of conservation. If it’s water, if it’s paper goods, um electricity. Conservation is always in my head.” Breanne, “I think it shapes my decision making in my daily life as far as trying to be, uh having an environmental mindset and purchase things that are more environmentally friendly and, and um cut down on waste as best I can.” This mindset influences daily decision-making, Luke, “and everything that I do uh I really make decisions based on how it’s going to impact the planet. Uh and I, I’ve always prided myself in doing just that. I make decisions uh in terms of purchasing; I make decisions in terms of activities and behaviors uh and try to assess the ramifications of uh, of those things.”

However, many people also spoke of limits to their actions. Some people said they don’t do enough, for example they don’t volunteer. This may come from the desire to do more and perhaps guilt over feeling that they should do more. For example, Allen said (285), “I may not be a good environmentalist or as good as I’d like to be...” Emma, “I probably really don’t do all that much. I mean I recycle and turn off lights and stuff like that. I’m not part of an organization and I don’t go to beach clean-ups, um....” And Eva, Um, I try to do the little part that I can do.

But I don't, I don't think we really go out of our way; neither of us goes out of our way in like community groups or anything like that. We don't go out and do, you know potato round-ups and all that. So I think we should go the extra mile but at this point we really don't."

For some the limits of their conservation behaviors may be due to convenience. For example, Joe mentioned recycling only where it is offered, "it's not offered out where I live so but at work I'm a fanatic about recycling everything I can because they do it here." Others assumed the lack of further activities meant it was not that important to them. Debbie described her activities and lack of activities this way, "not a, like a hardcore, I do my recycling and things like that. But I'm not, I think about it and I agree with people that get out there and do things to clean up the rivers and things like that. But I don't do it myself, I mean outside of picking up my own trash *laugh* I don't you know go help them do it or anything like that which I think if I was really firm belief like that I would get out and do, do something to help but." Others weren't sure what was stopping them. Miguel said, "Um, but at the same time, I think the, I don't take it nearly to the extent that I could. I don't know what's stopping me. Um I don't know what it is. Either it could be uh competing needs; um it could be a variety of things."

### **Spirituality Theme**

Although spirituality was not specifically addressed, it did emerge in the interviews. One participant stated, "I think it's (nature) very important more than recreation, spiritually" (Allen). Some reported a nature-based spirituality and others said that their feelings toward nature led them away from their religious backgrounds. They felt that religions that were anthropocentric in orientation led people away from connecting with and caring for nature. Others felt that although their religion did not discuss nature, they still felt nature represented God's creation and we should be caretakers and stewards rather than simply users. Nature-based spirituality ranged

from worshipping in nature, worshipping nature itself, feeling the divine in nature to feeling that nature represented all of God's creation. This is a topic that warrants further investigation.

People who were raised Christian had different opinions as to how Christianity taught them about nature. These different opinions ranged from a lack of attention, to negative, to positive. Pedro, spoke of the lack of attention to nature, "I don't know being Catholic, they have not, that I can remember, promoted for me to go out and be exposed to nature and care about nature." Eva, on the other hand, talked about the negative influence and opinions her Christian background taught, "they teach that we're the center of the universe and that pretty much. And that um nature and animals are for our use." "Looking back it makes me kind of sad that I spent so many years with that kind of brainwashing. I guess I, I, you know because that's well I grew up in an Abeca. The program I did was an Abecan Christian and all the science classes and everything was, that's what you learned; that we were the center of the universe and we were to use nature as for whatever we needed it for. And it's an interesting way to look back at things" Eva.

A more positive Christian influence on feelings toward nature was relayed by several people. For example Hannah said, "Because I believe that God created everything down to the little ants that crawl on the ground. And you know in God's world it's you know everything that he creates is beautiful. And you know he created everything for a purpose. Everything has a purpose like frikin dumbass bumblebees even have a purpose. You know and even though you're annoyed by mosquitoes that are so annoying, they serve as a purpose. Every single thing serves as a purpose right down to a flower you know. So I guess yea, I think that has, you know, that has changed the way that I look at nature because I know that God created it. It makes it a lot, you know, more beautiful to me. Wilma expressed similar feelings, "Mmm yes because a part of well, nature to me is everything that God made was nature, I mean everything that he made. So I

believe in God and I believe that he's part of everything we see and do and you know every animal, every you know, there's a, there's part of him in every part of it."

Emma on the other hand spoke about how she feels differently from many Christians because she believes in conservation, "You know that's a great question and I love talking about it. Um...I am a Christian. In my view, is that God put us here to be caretakers of his creation. That means that we should not abuse but take care of. That means, that means conservation. That means making sure we have clean air and clean water and everything else. So it sort of goes against what the sort of right-wing, you know, fundamentalist Christian right, *laughs*...stands for in my opinion. So I think that yes, I think that yes, my religious beliefs do." But Emma also talked about how there are some Christians who are coming around to the importance of protecting nature. "Anyways, they are really trying to push more of the kind of view that I have that we're here to take care of it and conservation and to take care of nature as our responsibility as Christians." And this new development makes her happy as noted here, "I'm so happy! I get all happy whenever I think about it."

Some people said their feelings for nature influenced their spirituality and religious beliefs, in these cases, these individuals had steered away from their Christian background. Luke stated, "and you know it probably *clears throat* my, a, my interests in, in my uh you know affection for nature has influenced my religion. For example, you know Christianity is very uh egocentric and I hate that about Christianity. Man is not at the center of the universe. And that's one of the problems with, with our planet. It's a, it's a, it's an, it's an anthropocentric, egocentric uh existence for most people." Luke now describes himself as agnostic. However, of the three others who said their switch was definitely or likely influenced by their feelings toward nature, one said they may have a more Eastern leaning, Rosella switched from Christianity to Buddhism,

and Carlos described his spirituality as “I have studied shamanism and earth-centered religions. I am, if any label would fit, a pantheist. Nature is god...or goddess.”

Like Carlos, Breanne had also researched other religions for more nature-based orientations. “I wouldn’t subscribe to any one religion. I’ve studied a lot of religions and I’ve studied a lot of cultures that have deep reverence for nature. And so I would say that my study of those cultures and of those religions have um I’ve found different meditative practices and different exercises such as tai chi um and other ceremonies and things that you can do in nature that I even though I’m not part of those cultures or those religions I can appreciate those ceremonies and use those ideas as a way for me to um spend in time in nature with that. So I think there’s a lot to learn from some of the cultures and the religions that are more earth-based spirituality and um (Breanne).”

One participant was raised to have a nature-based spirituality. He’s a Native American that practices Handsome Lake or Longhouse religion, “I focus my spirituality on nature and on, and on the Earth Mother. And uh I pray, it’s very important to me. For instance, last night there was a big storm and I went outside and I prayed to the beings that bring the storm and in our language their kind of their kind of the thunderers I guess. And um, and I make offerings to nature in my prayer. But that’s part of a tradition I was brought up in. So it holds, holds, I see I guess, I guess it would be kind of a form of animism (Joe).”

Joe’s nature-based religion and spirituality is reflected both in how he regards nature and his everyday activities. Joe sees “life in all things in nature and spirit so, so (that’s) very important.” Daily rituals include praying and giving thanks, for example, “I usually pray in the morning and my prayers involve nature and honoring different aspects of nature,” and, “when I eat I give thanks to the beings that gave themselves so I could live.” Also, his relationship with

nature is not just about taking and asking. Joe describes giving back in this way, “Yea, I, well I, I believe there always has to be an energy exchange so if, if I’m asking for something spiritually (*pause*) if I’m asking for something spiritually I will give something back. So if I’m praying, I’ll leave an offering of tobacco or cornmeal or something like that. Um or whatever I have available. If I just have water I’ll just explain that that’s something valuable to me right now and I’ll leave it. Um if something’s given to me like a feather, um if it’s placed there and it’s something that I was meant to find, I’ll leave something in place of it you know.” But his giving back is not just situational, or one-time gifts based on what he’s asking for at the moment as he said, “when I’m praying or if I’m making an offering to the earth I make a pledge that I will um do all that I can to protect, to protect her. And for me that’s education so I work um to try to educate people to value nature especially kids so.”

Joe also believes there is a form of communication with nature. “In fact, I believe that, that Creator gives people messages through nature and this is another tradition I was taught. For instance, if I see an owl I know that, that means a certain things. Or if a crow comes and stands over me and starts cawing over and over again I know that means something else. So every, every, I guess through nature I feel like I can communicate with Spirit so (Joe).”

Finally, spiritual feelings and experiences were described. Spiritual feelings were described by Amanda as, “Um it’s peaceful when I’m out in nature I feel relaxed and connected. Um...I guess since I’m not religious that’s the closest I get to religion is the spiritual feeling I get when I’m in nature.” Some specific spiritual experiences that were discussed included revelations, a mystical experience, and communication or communing with non-human species. Luke who described three different spiritual experiences described one such experience as, “I’d say just a *clears throat* like uh, uh, uh kind of simultaneous ex you know, widely expansive uh realization

that there's a lot of things out there that we don't understand and that the world is a very large place and that nature's you know just completely amazing, as we are, uh, as you know, machines essentially. And so I guess spiritually what does that mean? I guess it just means that you know at that moment I just had this rush of realization that nature was uh just completely amazing and uh totally large in scope and beyond and mostly beyond comprehension.”

### **Identity Theme**

This theme has to do with how much a person identifies with nature or how much of their identity is tied to nature and the impact nature has on their life. Although it is related to connection, there were connected people who did not have lives centered around nature and people who were not as connected who could not live without nature. There were those whose identities were tied to nature or the environment. Nature influenced career, behaviors, purchasing, leisure, vacations, and often came first in someone's life or second to family. The more influence nature has, the more it influences identity and the more profound the connection. In this sense it seems that a deep connection to nature can provide personal identity.

Personal identity is not as well defined in the literature as Social Identity Theory or Identity Theory. While all identity theories describe how people define and categorize themselves, group categories such as Hispanic, Gator fan, or Floridian is described as social identity. Categorizing oneself into roles such as occupation, mother or husband is described by Identity Theory. Whereas personal identity consists of the values, goals and meanings that define a unique and core self, therefore influencing both role and group identities. Many of the people interviewed valued nature, they had goals to protect and care for nature, and nature gave meaning to their lives. Furthermore nature often provided role identities such as gardener, environmental educator, activist, and advocate. Group identities such as environmentalist, treehugger, nature-lover and animal lover were also influenced by connection to nature.

Connection to nature influenced a number of respondents' careers. For example, Joe describes why he chose the field of environmental education as his career, "I make a pledge that I will um do all that I can to protect, to protect her. And for me that's education so I work um to try to educate people to value nature, especially kids so." Breanne said, "Yea, um I always knew that I wanted to work with nature in one way or the other. And I didn't exactly know how that was going to shape up and so um my degree was on an interdisciplinary level, it was interdisciplinary ecology so I could learn a lot about a lot of things. I don't have really a focus except for you know I decided that education was a good avenue to teach other people about nature and that's why I'm focusing on that right now." Carlos said, "Nature has directly impacted the person that I am today. I have always had an affinity for natural settings and this has resulted in my desire to work in conservation and environmental education" Career was a common avenue for influence. Seven interviewees have or want to work in zoos, three are working on advanced degrees in natural resources and one is working on a Bachelor's degree in natural resources. Another interviewee has worked in National Parks and several have done volunteer work for NGO's.

Having a connection to nature also influences where people live. Wilma said, "I'd say yes because um I live you know out away from town. I live in the woods so I can be closer to that kind of thing because that's so much a part of me." Lucy who commutes an hour to work so that she can live in the country said, "Ah well I love it. That's why I live in the country. Cause you know you're out and don't have somebody sitting next to you. And now I get to sit and watch the squirrels and I have um goats and donkeys so. Mm watch hummingbirds, that's nice now. You get older you sit on the rocking chair and watch nature."

Nature influences choice of vacation as it serves as a prime interest and motivator. Miguel said, "...it affects where I go when I do vacation. It affects where I'm gonna go. If uh the places that I'm gonna visit do not have any nature areas that I can visit, I don't go. Generally, I just don't visit those areas. So uh they have to have some form of wildlife to a greater extent than just a zoo or something like that." Don, Allen and Rosella also discussed or mentioned the National Parks they've visited. For example, Rosella said, "I've been to most of the National Parks in the United States, more than any average American I'm sure."

Having a connection to nature also influences what people are motivated to do and learn and who they are motivated to socialize with. For example Pedro described what a large influence his connection has had on him, "Well I mean you, if you're exposed to nature and you get to love it, you tend to respect it. And if you respect nature, you'll learn to respect you everything else. You're work, you're people next to you, you know um laws, rules, etc. because you know um with everything that been happening in the you know in the last 100 years um in terms of green areas. Um like I have friends that you know they're not too nature-based, they're more city type you know and then you are supposed to either gangs or do nothing or play station all day long and I don't know. I don't see myself doing that or getting that limited you know. Nature kind of opens also your mind and, and the possibilities are endless because I don't see only all of nature what is you know every time I see a program in TV "Oh, where's this place? You know I want to go, I want to see it." Or National Parks, I want to see all of them. Oh you know and this, it keep making you want to learn more and visit more places. So it making you want to travel, want to meet other places, other people. At least to me, it's very, like I said, very, very important. And I think it make me want to socialize and, and like at least you know another point of view. You know may you see nature some other way than I see nature you know. Like,

like when the discussion I have with Luke, like he's but I don't know if you're vegetarian, but he's vegetarian, I'm not. We discuss stuff like that you know so that's."

Breanne (65-67) discusses how nature influences not only her social interactions but who she is, "And I think the time that I spend in nature also shapes um how I interact with people and how I interact with the world because I learn a lot from spending time in nature. So I think that it forms who I am." For Don nature reinforces aspects of self identity, "But maybe only reinforce who I think I am. If I view like I view myself as really pro environment, so I go there I, I maybe I will, I will see like what I have did is right. Of course that's a rewarding experience. Um ...nature experience to the future to who I am."

Nature also influenced or reflected how people viewed their personality. For example, Amanda felt that (40-41), "I think nature has a tendency to give people kind of a laid back feel. Um also, relating to the earth. Like I tend to be laid-back, earthy, um, treehugger." Naomi said, "Um in a way because it's peaceful, it's quiet, it's kind of relaxing and that's usually how I see myself as." And Nola felt nature reflected the, "Uh freedom—the freedom peaceful side of myself."

Nature allows those who feel connected to be their true self, to feel free to just be themselves. Wilma described this by saying, "I'd say that it lets you just be you. Um you know you don't have to be something that you aren't when you're with nature because you are that, nature is the real you!" Rosella also feels nature lets her express her true self, "Yes, yes, when I go out in nature I feel like a I can pray more freely. I feel like I can talk to a to a even the tree or a plant and you know it help me to express my own inner self, to bring it out. Yes."

Nature is where several people said they not only feel most like their true selves, but also the most comfortable. Breanne described her comfort in nature this way, "I think that when I'm

spending more time in nature, for example if I'm out camping for 2 weeks and I've been out in nature I start feeling more like who I really am then when I'm in a city or when I'm in a lot of buildings. I, I feel like um when I'm out there it reminds me that, that is the most natural of ways to be uh you know. When I come back it feels totally foreign. Whereas, I know you know with some people when they go out in nature it feels foreign. For me, coming back with buildings and cars and roads feels less natural, feels more uncomfortable and so you know I'd say that being in nature um reminds me that I am a part of nature and that is the most comfortable and rewarding feeling."

Several people find that their relationship with nature defines themselves or is one of the most significant aspects of their self. For example Breanne describes herself as, "connected or earth-connected um I, I would choose that over natural because I'm not sure exactly what you know natural or naturalistic, I would, I would use that um to describe you know that I acknowledge my relationship with nature."

Nature also provided meaning in life for people. Meaning was felt through moving experiences such as the spiritual experiences that were discussed. Meaning is provided through career choice and through hobbies and interests. Hannah described how caring for an orphaned owl provided her with meaning, "Like you know how people go throughout their lives every day and they go to work and yada yada yada but they don't really have a meaning and stuff like that and, and I felt like with him I just. It was awesome because I could help him but yet he was helping me to all at the same time like we were kinda helping each other. You know what I'm saying?"

### **Fear Theme**

Fear and other negative feelings were expressed for certain aspects of nature –often snakes and/or insects or storms. Discomfort in nature or feelings of alienation were also expressed.

Often these negative reactions were more common with those who had less of a connection and/or less experience with nature. However, people who felt a deeply profound connection with nature also expressed some fear for nature in the same way. Perhaps some fear of nature and the power of nature is a natural survival instinct. In other cases, it may be remnants from influences that are not so connected (such as parents), a time when the person was not as connected or even from various traumatic experiences.

Jennifer who is not very connected to nature, said that she associates nature with, “Gross, disgusting, um bugs, dirt, no shower, um, I don’t know, just being outside, humidity, cuz I live in Florida.”

Miguel who began participating in nature-based activities as an adult and within the past decade, enjoys nature and looks forward to time in nature, still does not feel completely comfortable in nature “Um, so a lot of times even though I really enjoy going to it, I still feel alienated a lot of times. I don’t, I can’t think because I don’t understand nature that well. Um, so I, I feel a lot of times a lack of control in nature which I don’t feel necessarily like in the city, I feel a lot more control.”

Fear for certain animals or forces in nature were described. Several people relayed a fear of animals such as snakes, spiders, frogs, bugs, bears and alligators. Ned described a time when he was canoeing and was hanging on to a branch overhanging the water when, “all of a sudden this spider, HUGE, hairy just ugly, gray spider. And I use the word ugly for insects because I don’t like insects. This spider came down and climbed on my arm. And I screamed like a girl. I let go and I just let the river take me. And finally we were able to get our stuff and get the canoe back on land. And everybody met us around to the other side. It was quite traumatic for me. I had to have a beer. It was so ridiculous *laughing*.”

Fear of certain animals or aspects of nature can result from bad experiences and the fear can be overcome as Eva describes, “It was actually we were in a park and my mother came into the bathroom and I was little. I was little, little. And she had let me go in the bathroom stall by myself as a little girl probably 4 years old. And she’s like, ‘Are you OK?’ And she opens the door and she tosses a tree frog at my face like as a joke. My mom was young; she was probably 23 when this happened. And it, you know, sucked onto my face and so ever since then I was like nervous about little animals but I’ve overcome that since.”

However, other traumatic experiences lead to avoidance. For example, Miguel cannot go camping for fear of bears and a possible close encounter when camping, “Um, camping, (*laughing*) which maybe why I don’t like camping. Um I just um bear noises that were relatively close. I never saw a bear um may not even have been a bear. But the growling affected me and since then any single time I go camping and I know there are bears close by I, I have trouble relaxing. So I would much rather prefer staying in a hotel or some sort of accommodation that’s something like that like a cabin or something then, then camp.” Eva had a traumatic experience in the ocean and even though she finds water very relaxing, she will not go in the ocean, “I was stung by a um, um, man-o-war. So I don’t get in the ocean anymore, um-mm. No, so I don’t and I’m, I’m nervous. I’ve stepped on things and been bit in the ocean. So I don’t get in the ocean anymore.”

Fear of the power of nature was also noted. Don said simply, “I fear the power of nature.” Liz said, “Sometimes when nature gets out of control it’s kind of scary... Yea, hurricanes and forest fires and tornados and.” This fear of certain aspects of nature also exists among the most connected people. For example, Joe, who is extremely connected to nature, also fears aspects of nature. He relayed a story of being afraid of an alligator when he was young and even recently he

himself was affected by nature's power and has some fear from that as described here, "But uh, yesterday when I went out and prayed there was a really bad thunderstorm that went by my house and I went outside to ask to give thanks for the rain but to ask to spare the beings on my property – the trees and the my wolves and horses. I had a horse get struck by lightning a few years ago. So I'm always very fearful of that so that's why I go outside and pray 'please protect us' and, and um."

And this fear can exist in people who work with dangerous animals for a living. Ned works with bears and other large mammals. One of the bears he works with even severely injured a keeper years ago, yet Ned does not like insects and even related a fear of them, as described in the story above. When asked about this disparity he said, "Yes, I mean to me that's fine because she was not and, and this is my opinion. This is only my opinion. But she was not giving that animal the respect that it needed. So if you respect the animal, you know and that's where I'm saying you know you have to be on the same level as the animal or as nature and you respect that particular animal then that animal is going to respect you. But know insects they just willy-nilly just bite you and fly on your mashed potatoes or potato salad and take of again. You know the bear won't do that (*laughs*)."

### **Results for Steps 2 and 3: Develop and Test Items for Each Defined Domain**

Twenty-four to 34 items were developed per each of the nine dimensions (see Appendix C) for a total of 261 items. A sample of 25 people interested in outdoor recreation or natural resources from the University of Florida Department of Tourism, Recreation and Sport Management assessed the connection items providing Thurstone-type judgments for each. Items were rated on a 7-point scale for the degree that each item represents its corresponding domain. Participants were continually instructed not to rate items based on the amount they personally disagree or agree with the item; rather they rated items based on their perception as to whether or

not the items represent the domain. Items that did not receive a mean score of at least 4 were not considered to be representative of the corresponding domain and were deleted from the item pool. For each theme or dimension, 10 to 16 items with the highest mean scores were chosen to be pretested. This resulted in a pool of items.

#### **Results from Step 4: Pilot Testing the Survey: Selecting and Revising Items Based on Respondents**

An item pool of 111 items were pilot tested with a small group of five adults using a think-aloud. The purpose was to ensure that participants understand the survey instructions and all items. Areas designated as having potential problems in the pilot were modified accordingly. No items were eliminated at this stage.

#### **Results from Step 5: Pilot Testing the Survey: Selecting and Revising Items Based on Item Analysis**

A convenience sample of 113 students in an introductory course in the Department of Tourism, Recreation and Sport Management at the University of Florida took a survey that included 111 test items. An item analysis was conducted that examined item variability, item discrimination, response location, item correlations and item covariances. The results of this analysis were used to discard items that did not perform well.

Tables 4-1 through 4-17 show the results of the item analysis for each domain. The item analysis consisted of the item variability, item discrimination, response location, item correlations and item covariances which were explained in Chapter 3. The results of the analysis are depicted in two sets of tables per domain. The first table depicts the results for the items tested. The second table depicts those items that qualified for the next stage of testing based on the items analyses. The results for each domain are depicted in the corresponding tables and summarized here. The restoration/tranquility domain, ten items were tested and based on item analysis four items were discarded for not performing well. For example, item P9 has a high

mean or response location and low variability, and item P8 had low item discrimination as the item-total correlation was low. For the awe domain thirteen items were tested and six were discarded. The appreciation domain began with twelve items and ended in six. The caring items were trimmed from thirteen to six. Thirteen items were tested in the fear domain and eight were dropped. The twelve spiritual items all performed well, therefore, none were discarded. Of the ten sorrow/grief items that were tested, four were dropped. The oneness domain began with fifteen items and resulted in nine that performed well. And finally, the identity domain began with twelve items and item analysis trimmed the number of acceptable items to nine. This stage eliminated 45 items, leaving 66 that performed acceptably well at this stage.

### **Results from Step 6: Assess Reliability and Internal Structure or Dimensionality**

#### **Test One**

From the pool of 66 items that performed well in step 5, three to five items from each domain were chosen for the next round of testing. These items were chosen based on a face validity review by several professors in natural resources-based tourism and recreation. The survey included a total of three to six items each for all 9 domains. Six of the domains also had at least one negative item each. A total of forty-one items were tested with two separate samples that consisted of 234 members of green groups and 532 members of an introductory leisure course. The surveys were conducted online using SurveyMonkey software. The groups were contacted via an e-mail sent out by their organization. The introductory pages of the survey explained the purpose of the study as well as the voluntary and confidential nature of the survey and gave contact information.

Data were analyzed separately for each sample using SPSS 12.0. The item analysis revealed that all of the negative items performed poorly. Inter-item correlations for these items were too low. This left three or four items per domain to run factor analysis and test

dimensionality. However, the factor analysis failed to reveal a stable factor structure. Factor structures are often found to be unstable with too few items per domain and become more stable as the number of items per domain increases (Marsh, Hau, & Balla, 1995). Therefore, it was decided to abandon this data set and run another test of the items.

## **Test Two**

Since the negative items have consistently failed to perform well on all item tests thus far, only positive items were included in this test. Furthermore, four to six items were tested for each of the domains for a total of forty-seven items. These items were the strongest psychometrically (from the item analysis in step 5) of the 66 items that made it into the item pool. A sample of 529 students from an introductory leisure course took this test. The surveys were conducted online using SurveyMonkey software.

## **Participants**

A total of 529 students in an introductory leisure course at the University of Florida took this version of the survey. Thirty three percent of the participants were male and 67% were females. The majority of participants, 77%, were Caucasian and nine percent were African American and eight percent were Hispanic/Latino. Seventy-two percent of the sample grew-up in urban areas. Ages ranged from 38 to 18, with 83% aged 23 to 19 (see Table 4-18). In terms of political affiliation, 42% were conservative and 38% were liberal while 40% of the sample were democrats and 41% republicans (see Table 4-21 and Table 4-22). In terms of time spent in outdoor recreation (see Table 4-19) the most frequent activities were camping and fishing followed by kayaking/canoeing, motor boating, nature appreciation and day hiking, in that order (see table 4-20). Frequency of participation in outdoor recreation ranged from a low of an average of zero hours per month (4.1% of respondents) to a high of 100-200 hours (0.6% of respondents) and a mode of one to five hours per month (41.4% of respondents).

## **Item analysis**

Item analysis revealed that all items performed well. Therefore, all items were entered into exploratory factor analysis to test dimensionality.

## **Exploring, cleaning and splitting the data**

The data was first examined for outliers and missing values. Few missing values were found, so no adjustments were made. To look for outliers, boxplots of each variable were examined. Data from eighteen respondents were removed because their responses were identified as outliers for at least 10 of the CTN items (this is based on conventionality). Next, the data was randomly split into two data sets to reduce Type 1 error (Hair, et al, 1998). Data set A, with a sample size of 249, was used to first perform exploratory factor analysis. Data set B, with a sample size of 262, was used to confirm the dimensionality using confirmatory factor analysis. This sample size is adequate for factor analysis as it allows for at least five participants per item (Bollen, 1989); which would be 235 participants for 47 items. The sample also meets the minimum total sample size of 200 recommended for structural equation modeling with maximum likelihood estimation (Hair, Anderson, Tatham, & Black, 1998).

To check for normality, skewness and kurtosis values were computed for each data set (Set A: Table 4-23 and Set B: Table 4-24). In a normal distribution, skewness and kurtosis values should be zero. Although these values should be converted to z-scores for small samples, in large samples (data sets larger than 200) the values are inflated and so the significance of the standardized values is of little value. Therefore, the shape of the distributions were examined for each variable as well as looking at the unstandardized skewness and kurtosis values (Field, 2005). Several of the appreciation items were skewed and/or kurtotic as was item Awe10. Therefore, these items could cause problems in later analyses.

### **Internal structure/dimensionality**

The internal structure or dimensionality was first tested with a series of exploratory factor analyses (EFA) performed on data set A using SPSS 12.0. Factors were extracted using maximum likelihood extraction and direct oblimin rotation. Maximum likelihood extraction was chosen as recommended in a study of factor analysis (Costello & Osborne, 2005). Oblique rotation was chosen to allow for the correlation of all constructs. All factors should be correlated since they are dimensions of the same construct. Two further checks were used to see if the data should be analyzed using oblique rotation. First, the correlations between the factors were in the moderate range, indicating a relationship. Second, when an orthogonal rotation was tested it did not provide an identical solution, indicating that the constructs are not independent (Field, 2005). The analyses revealed six factors (Table 4-25): awe, identity (which consisted of both oneness and identity items), spirituality, sorrow, fear and restoration. Neither caring or appreciation items factored.

To confirm the factor structure and establish the efficacy of the overall model for connection to nature, both the measurement model and the overall model were tested. The analyses were conducted using AMOS 7.0. The overall conceptual model, or second-order factor model depicted in figure 4-1, shows the relationship of the first order latent variables (the dimensions measured indirectly by the manifest or observed variables) and the second order latent variable – the overall construct, CTN.

To test the measurement model, the six dimensions that factored in the EFA were entered into a confirmatory factor analysis using data set B. The six factor model fit the data with acceptable fit indices (Table 4-27). Next, modification indices for the items were examined to determine if any items should be removed. Items that were identified by the modification indices as poor fitting were also examined in terms of conceptual need for the dimension. Two

spirituality items (spir8 and spir12), two sorrow items (sor1 and sor7), one awe item (awe8) and one identity item (Id9) were removed one at a time. Each item's removal resulted in an improvement in fit (see Table 4-27 for fit indices for this parsimonious model and Table 4-28 for fit indices for the model with only spir8 removed). The final model is depicted in figure 4-2 and depicts a six factor model with 26 items (4 items each for spirituality, awe and sorrow, and 5 items each for identity and restoration).

The final measurement model fit statistics are depicted in Table 4-27 and are as follows: Chi-square/df ratios (556.89, df=284, 1.96, p=.000) were lower than the suggested threshold of 3.0 (Carmines & McIver, 1981; Kline, 1998). The root mean square error of approximation (RMSEA) value (.061) was lower than .08, indicating adequate fit (Brown & Cudeck, 1993; Hu & Bentler, 1999). The Comparative Fit Index (CFI) was .93 and the Tucker-Lewis Index (TLI) was .94; both greater than the recommended .90 (Brown & Cudeck, 1993; Kline, 1998). In addition, the standardized root mean square residual (SRMR) was .053, less than .08 which is considered good fit (Hu & Bentler, 1999).

Since the measurement model performed well, the next step was to conduct a second-order confirmatory factor analysis to test the fit of the dimensions to the CTN construct. This model is depicted in figure 4.1 and the fit indices are in Table 4-26. Chi-square/df ratios (630.98, df=293, 2.15, p=.000) were lower than the suggested threshold of 3.0 (Carmines & McIver, 1981; Kline, 1998). The root mean square error of approximation (RMSEA) value (.066) was lower than .08, indicating adequate fit (Brown & Cudeck, 1993; Hu & Bentler, 1999). The Comparative Fit Index (CFI) was .91 and the Tucker-Lewis Index (TLI) was .92; both greater than the recommended .90 (Brown & Cudeck, 1993; Kline, 1998). In addition, the standardized root mean square residual (SRMR) was .073, less than .08 which is considered good fit (Hu &

Bentler, 1999). The fit of this model to the data indicates that the CTN construct consists of these five dimensions.

### **Reliability**

Reliability was measured using Cronbach's coefficient alpha ( $\alpha$ ) for internal consistency and average variance extracted (AVE) for each factor (Table 4-26). Cronbach's alpha ranged from .86 to .91 for the CFA exceeding the .70 minimum (Nunnally & Bernstein, 1994). AVE scores, indicating the "overall amount of variance in the indicators accounted for by the latent construct" (Hair, Anderson, Tatham, & Black, 1998), ranged from .56 to .70. All were greater than .50 as recommended (Hair et al., 1998).

### **Convergent validity of the internal structure**

Evidence of convergent validity for the scale is provided by the items' loadings on their respective constructs. The standardized regression weights from the measurement model for all items ranged from .71 to .90, which are greater than the 0.70 conservative threshold (Hair et al., 1998; Litwin, 1995). The second-order factor model also further supports convergent validity of the scale as the relationships among all six dimensions are significant, and the relationship of the overall construct (CTN) and the dimensions are significant at the .05 level as indicated by the critical ratios (Anderson & Gerbing, 1988).

### **Discriminant validity of the internal structure**

Evidence of discriminant validity is provided when the correlation between the dimensions or factors is not markedly high (i.e.,  $> .85$ ) as to indicate that the dimensions overlap conceptually (Kline, 1998). Table 4-29 shows the correlation among the dimensions all fall below this threshold, ranging from  $-.268$  to  $.77$ , indicating discriminant validity.

## **Results from Step 7: Construct Validity Studies**

Evidence of convergent and discriminant validity for the CTN construct was assessed by correlations with similar and dissimilar constructs (Crocker & Algina, 1986; DeVellis, 1991). Evidence of predictive validity of the CTN construct was appraised by testing the relationship of CTN to environmentally responsible behavioral intentions.

### **Convergent Validity**

Evidence for convergent validity of the CTN construct is provided by positive correlations to similar constructs (Spector, 1992). Five measures of similar constructs were correlated with the subdimensions of CTN. One-tailed significance tests were used since all relationships were hypothesized to be positive. Pearson correlations are shown in Table 4-30. Mayer's and Frantz's Connectedness to Nature (CNS) scale is meant to measure the same construct, therefore correlations should be high between it and CTN, except for fear. All correlations between the CNS and CTN subdimensions (except for fear which is negatively correlated as it should be) were positive and significant at the .01 level. However, two of the three subdimensions had moderate correlations, and the highest, .75, was with the identity dimension. This dimension is likely the most similar to the CNS scale which is meant to be unidimensional. Since CTN is hypothesized to be an aspect of personal identity, it should correlate highly with measures of self identity and role identity. The highest correlations were with the identity subdimension, .69 and .77 for role identity and self-identity respectively. Finally, there should be a positive relationship between CTN and the self-transcendence values of benevolence and universalism. However, in this case although all correlations between CTN subdimensions and universalism were significant at the .01 level, all were moderate. Correlations with benevolence and all CTN subdimensions were low and only one was significant (sorrow at  $p < .05$ ).

## **Discriminant Validity**

Evidence for discriminant validity of the CTN construct is provided by a lack of correlation between CTN subdimensions and dissimilar constructs. Here, it was hypothesized that the correlation between self-enhancement values of power and achievement and CTN would be low. All of these correlations did, in fact, prove to be low with this sample (Table 4-31). Only one correlation was significant – the correlation between awe and achievement ( $r=.17, p<.05$ ). In addition, the CTN constructs should not be related to social desirability which was measured by the short form (Strahan and Gerbasi, 1972) of the Marlow-Crowne Social Desirability Scale. These correlations were low and although one was significant it was less than  $-.1$  (Table 4-31). Egoistic concerns, which should also be very different from CTN, were measured and found to have low and non-significant correlations with all CTN subdimensions (Table 4-32).

## **Predictive Validity**

Evidence for predictive validity of the CTN construct will be provided by how well the CTN subdimensions predict environmentally responsible behaviors (ERB). A modified Environmentally Responsible Behavior Index (ERBI) (Smith-Sebasto, 1995) was used containing 18 questions asking about the frequency of environmentally responsible behaviors (these are self-reported behaviors, not behavioral intentions). However, before the regression of CTN on ERB was conducted, a factor analysis of the ERB scale was conducted to divide the scale into potential subscales to provide more accurate measurement.

Exploratory factor analysis using maximum likelihood extraction and direct oblimin rotation of the ERB items revealed three factors (Table 4-33). The factors were 1) civic, consisting of five items including voting, being informed and discussing issues, boycotting and supporting groups and causes; 2) the 3 R's consisting of five items including reducing, reusing, buying recycled, buying less packaging and using CFL bulbs; 3) committed, consisting of four

items including writing letters, composting, reducing the use of pesticides and buying shade-grown coffee. Indices of each dimension were made for the purposes of regression analysis.

To see if CTN is a predictor of ERB, the relationship of the CTN dimensions were regressed on the ERB dimensions. Since this study is exploratory, stepwise regression was used. First diagnostic statistics were run on the data for each analysis to check for normality, influential cases, independence of errors, multicollinearity and homoscedasticity. The Durbin-Watson statistic fell within 1 and 3 and were close to 2, indicating the assumption of independent errors is met. To check for multicollinearity, VIF and tolerance were checked. VIF values were all well below 10 and tolerance were above .2, therefore there the assumption of no multicollinearity is met. Casewise diagnostics, including standardized residuals, Cook's distance, average leverage, DFBeta and Mahalanobis distance, did not indicate any influential cases. Residual plots were examined for linearity and homoscedasticity and histograms and normal P-P plots were examined for normality. Here, the data seems to again meet assumptions except for the values for the committed ERB scores. For the committed ERB scores the data seems skewed and have heteroscedasticity, meaning the assumptions of normality and homogeneity of variance may be violated. Therefore results with this dependent variable should be taken with caution.

Stepwise regression for predicting the effect of CTN on the 3R's ERB's shows only two dimensions of CTN, and identity ( $F(1, 103) = 20.16, R = .41, \beta = .41, p < .001$ ) and restoration ( $F(1, 103) = 13.32, R = .46, \beta = .26, p < .05$ ), had a significant effect (Table 4-34). This means that for the 3R's identity, CTN explained 17% of the variance and restoration explained an additional .5%. Correlation and stepwise regression was used to detect significant predictors on the civic dimension of ERB. Two dimensions were entered into a hierarchical regression; sorrow ( $F(1, 103) = 58.90, R = .61, \beta = .61, p < .001$ ) and identity  $F(2, 103) = 35.57, R = .64, \beta =$

.25,  $p < .001$ ) (see Table 4-35). Therefore, for civic types of ERB, 37% of the variance was explained by sorrow CTN and additional .5% was explained by identity CTN. Stepwise regression was used to detect significant predictors for committed ERB's. Two dimensions of were entered into a hierarchical regression  $F(1, 103) = 12.15$ ,  $R = .33$ ,  $\beta = .25$ ,  $p < .001$ ) (see Table 4-36).  $F(2, 103) = 10.30$ ,  $R = .41$ ,  $\beta = .29$ ,  $p < .001$ ). So for committed types of ERB, the CTN dimension of identity explains 11% of the variance and awe explains an additional .6%.

Table 4-1. Item analysis for tranquility items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
P1	When I need to relax, I spend time in nature	3.44	1.044	.624	.823
P2	Nature is a way to escape all the cars, phones and noise.	4.06	.915	.658	.821
P3	I love how tranquil nature can be.	4.05	.766	.653	.824
P4	Time in nature breaks down all the stress until I feel completely refreshed.	3.36	1.098	.741	.811
P5	When I'm alone in nature, I have this feeling of complete calm.	3.62	.904	.667	.821
P6	Listening to the wind going through the trees calms my mind.	3.55	1.017	.690	.817
P7	When surrounded by nature, I feel at peace.	3.76	.926	.766	.811
P8	I'm not comfortable in nature.	2.04	1.084	-.398	.915
P9	I enjoy just sitting at a lake or stream and looking out on the water.	4.11	.777	.636	.826
P10	Without nature in my life, I would be much more stressed and tense.	3.68	.992	.771	.809

Note: Restoration/tranquility items ( $\alpha = 0.846$ ,  $n=108$ )

Table 4-2. Item analysis for remaining tranquility items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
P1	When I need to relax, I spend time in nature	3.44	1.044	.643	.891
P4	Time in nature breaks down all the stress until I feel completely refreshed.	3.36	1.098	.772	.870
P5	When I'm alone in nature, I have this feeling of complete calm.	3.62	.904	.683	.884
P6	Listening to the wind going through the trees calms my mind.	3.55	1.017	.688	.883
P7	When surrounded by nature, I feel at peace.	3.76	.926	.776	.870
P10	Without nature in my life, I would be much more stressed and tense.	3.68	.992	.776	.869

Note: Tranquility items ( $\alpha = 0.896$ ,  $n=108$ )

Table 4-3. Item analysis for awe items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Awe1	Sometimes when I look at the stars I feel really small.	3.57	1.108	.311	.915
Awe2	The beauty of nature can be overwhelming.	4.02	.961	.588	.901
Awe3	I have seen things in nature that are just so amazing I can't believe they exist.	4.15	.928	.633	.899
Awe4	I have felt such awe in nature that I was at a loss for words.	3.58	1.215	.723	.895
Awe5	I have been mesmerized by aspects of nature.	4.04	.808	.729	.896
Awe6	Watching wildlife fills me with awe.	3.62	1.086	.717	.895
Awe7	The magnitude of nature is awe inspiring.	3.93	.912	.760	.893
Awe8	Seeing majestic scenery has overwhelmed me with emotion.	3.50	1.048	.707	.895
Awe9	Nature can be breathtakingly beautiful.	4.37	.624	.613	.901
Awe10	I have seen things in nature that were so amazing; they just filled me with awe.	4.04	.898	.753	.894
Awe11	Nature has filled me with wonder.	3.87	.889	.669	.897
Awe12	Humans are just a small part of something big.	4.03	.945	.278	.913
Awe13	The power of nature is just incredible.	3.97	.814	.767	.894

Note: Awe items ( $\alpha = 0.906$ ,  $n=105$ )

Table 4-4. Item analysis for remaining awe items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Awe4	I have felt such awe in nature that I was at a loss for words.	3.58	1.215	.724	.888
Awe5	I have been mesmerized by aspects of nature.	4.04	.808	.704	.889
Awe6	Watching wildlife fills me with awe.	3.62	1.086	.748	.882
Awe7	The magnitude of nature is awe inspiring.	3.93	.912	.754	.882
Awe8	Seeing majestic scenery has overwhelmed me with emotion.	3.50	1.048	.719	.886
Awe10	I have seen things in nature that were so amazing; they just filled me with awe.	4.04	.898	.723	.886
Awe11	Nature has filled me with wonder.	3.87	.889	.642	.894

Note: Appreciation items ( $a = 0.901$ ,  $n=105$ )

Table 4-5. Item analysis for appreciation items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Ap1	I have a respect for nature.	4.41	.615	.716	.898
Ap2	I am grateful for nature's gifts.	4.31	.725	.711	.897
Ap3	I appreciate nature.	4.02	.940	.668	.899
Ap4	Spending time in nature makes me appreciate life more.	4.36	.557	.770	.898
Ap5	I appreciate all forms of life.	3.91	.900	.481	.908
Ap6	I appreciate the experiences I have out in nature.	4.01	.826	.793	.892
Ap7	Nature is like a great gift.	4.00	.877	.654	.899
Ap8	Nature should be cherished.	4.25	.676	.675	.899
Ap9	I admire the beauty of nature.	4.27	.697	.646	.900
Ap10	I try to honor nature.	3.81	.833	.594	.902
Ap11	Nature is the most important thing all humans have in common with one another.	3.03	1.122	.534	.909
Ap12	I take the time to stop and appreciate nature.	3.74	.888	.668	.899

Note: Appreciation items ( $a = 0.908$ ,  $n=105$ )

Table 4-6. Item analysis for remaining appreciation items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Ap4	Spending time in nature makes me appreciate life more.	4.01	.940	.693	.810
Ap6	I appreciate the experiences I have out in nature.	4.01	.826	.725	.807
Ap7	Nature is like a great gift.	4.00	.877	.619	.825
Ap10	I try to honor nature.	3.81	.833	.488	.847
Ap11	Nature is the most important thing all humans have in common with one another.	3.03	1.122	.570	.841
Ap12	I take the time to stop and appreciate nature.	3.74	.888	.729	.804

Note: Appreciation items ( $\alpha = 0.848$ ,  $n=105$ )

Table 4-7. Item analysis for caring items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Car1	I recycle as much as I can	3.49	1.088	.488	.866
Car2	I try hard to cut down on waste.	3.58	.932	.585	.861
Car3	I really want to try to protect nature as best as I can.	3.88	.832	.670	.858
Car4	My daily decision making is shaped by my environmental mindset.	2.72	1.110	.594	.860
Car5	I have a strong desire to give back to nature.	3.52	.892	.698	.856
Car6	I try to influence others to love and care for nature.	3.05	1.092	.742	.851
Car7	I buy organic food to lessen my impact on the environment.	2.52	1.351	.499	.868
Car8 recode	I only recycle when it is available.	2.88	1.086	.244	.880
Car9	Many of my consumer or purchasing decisions are made with the environment in mind.	2.85	.973	.668	.856
Car10	I have volunteered for nature, animal or environmental organizations.	3.15	1.221	.458	.869
Car11	I have many routine activities that I do to lesson my impact on nature.	2.87	1.015	.583	.861
Car12	It really feels good to help nature and wildlife.	3.86	.841	.561	.863
Car13	I am careful not to litter in nature.	4.15	.810	.478	.867

Note: Caring items ( $\alpha = 0.872$ ,  $n=104$ )

Table 4-8. Item analysis for remaining caring items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Car3	I really want to try to protect nature as best as I can.	3.88	.832	.587	.851
Car4	My daily decision making is shaped by my environmental mindset.	2.72	1.110	.661	.839
Car5	I have a strong desire to give back to nature.	3.52	.892	.695	.833
Car6	I try to influence others to love and care for nature.	3.05	1.092	.732	.824
Car9	Many of my consumer or purchasing decisions are made with the environment in mind.	2.85	.973	.628	.844
Car11	I have many routine activities that I do to lessen my impact on nature.	2.87	1.015	.646	.841

Note: Caring items ( $\alpha = 0.862$ ,  $n=104$ )

Table 4-9. Item analysis for fear items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
F1	I feel a lack of control when out in nature.	2.68	.958	.297	.925
F2	I am fearful of many aspects of nature.	2.85	1.077	.486	.916
F3	I have too much fear of nature to go camping.	2.07	1.134	.772	.904
F4	I do not want any wild animal to come near me.	2.53	1.214	.739	.905
F5	A lot of nature just scares me.	2.28	1.092	.806	.903
F6	Hiking in the woods would make me nervous.	2.33	1.136	.784	.904
F7	If I went hiking, I would be too afraid of all the bugs and snakes to enjoy myself.	2.34	1.187	.784	.903
F8	Nature is not my cup of tea.	2.30	1.140	.700	.907
F9	Nature is just disgusting.	1.69	1.015	.724	.907
F10	I can live without nature just fine.	2.16	1.158	.487	.916
F11	I have had traumatic nature experiences that make me uncomfortable in certain natural areas.	2.10	1.075	.706	.907
F12	Some aspects of nature, like snakes, really freak me out.	3.03	1.303	.466	.918
F13	I am afraid of wildlife.	2.25	1.113	.792	.903

Note: Fear items ( $\alpha = 0.916$ ,  $n=104$ )

Table 4-10. Item analysis for remaining fear items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
F4	I do not want any wild animal to come near me.	2.53	1.214	.542	.886
F5	A lot of nature just scares me.	2.28	1.092	.582	.880
F6	Hiking in the woods would make me nervous.	2.33	1.136	.684	.872
F7	If I went hiking, I would be too afraid of all the bugs and snakes to enjoy myself.	2.34	1.187	.710	.864
F8	Nature is not my cup of tea.	2.30	1.1440	.464	.897

Note: Fear items ( $\alpha = 0.902$ ,  $n=104$ )

Table 4-11. Item analysis for spirituality items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Spir1	I have had spiritually moving experiences in nature.	3.29	1.121	.583	.945
Spir2	I have spiritual feelings that are nature-based.	2.95	1.109	.766	.939
Spir3	I have had spiritual revelations in nature.	2.97	1.127	.755	.939
Spir4	I see all things in nature as having spirit.	3.13	1.172	.670	.942
Spir5	Through nature, I feel I can communicate with Spirit or God.	3.12	1.201	.750	.939
Spir6	Nature provides me with a spiritual connection.	3.03	1.161	.837	.936
Spir7	Feeling part of nature is a spiritual experience.	2.95	1.186	.864	.935
Spir8	Communing with nature is a great form of spirituality.	3.02	1.115	.764	.939
Spir9	There are natural areas that feel sacred to me.	3.29	1.155	.590	.944
Spir10	My feelings for nature have influenced my spiritual beliefs.	2.67	1.161	.814	.937
Spir11	I have had amazing mystical experiences in nature.	2.89	1.214	.748	.939
Spir12	Without nature I would feel a spiritual void.	2.82	1.205	.763	.939

Note: Spirituality items ( $\alpha = 0.944$ ,  $n=104$ )

Table 4-12. Item analysis for sorrow/grief items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Sor1	I regret the negative impacts I have on nature.	3.65	.963	.524	.855
Sor2	I don't think there's any impact on nature from reverse what I do.	4.01	1.000	.200	.881
Sor3	Seeing dead wildlife in the road is really heartbreaking.	3.74	1.043	.457	.861
Sor4	I think the environment is in major trouble.	3.87	.946	.568	.852
Sor5	Seeing how much nature is being destroyed is very upsetting.	3.50	1.024	.741	.837
Sor6	I get really upset when I see people hurt nature.	3.63	.916	.559	.852
Sor7	The rate at which people are devouring nature is tragic.	3.80	.960	.690	.842
Sor8	It is upsetting when people want to sweep environmental problems under the rug.	3.75	.943	.646	.846
Sor9	When people don't think about the long term impacts of their actions on nature it upsets me.	3.62	.988	.725	.838
Sor10	I feel sorrow because of the rate we're destroying nature.	3.81	1.006	.691	.841

Note: Sorrow/grief items ( $\alpha = 0.864$ ,  $n=104$ )

Table 4-13. Item analysis for remaining sorrow/grief items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Sor5	Seeing how much nature is being destroyed is very upsetting.	3.50	1.024	.696	.846
Sor6	I get really upset when I see people hurt nature.	3.63	.916	.575	.866
Sor7	The rate at which people are devouring nature is tragic.	3.80	.959	.669	.851
Sor8	It is upsetting when people want to sweep environmental problems under the rug.	3.75	.943	.686	.848
Sor9	When people don't think about the long term impacts of their actions on nature it upsets me.	3.62	.988	.764	.834
Sor10	I feel sorrow because of the rate we're destroying nature.	3.81	1.006	.648	.855

Note: Sorrow/grief items ( $\alpha = 0.872$ ,  $n=104$ )

Table 4-14. Item analysis for oneness items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
One1	I consider myself to be part of nature.	3.72	.966	.750	.910
One2	Smelling flowers, hearing animal sounds, and feeling the wind makes me feel connected to nature.	3.92381	.948	.737	.911
One3 recode	Humans are separate from nature.	3.42857	1.046	.272	.924
One4	To me nature is a friend who's always there.	3.29524	.980	.752	.910
One5	I feel a deep connection toward nature.	3.41905	1.026	.774	.909
One6	I am connected to nature much like I'm connected to my family.	2.67619	1.156	.691	.911
One7 recode	I do not feel connected to nature.	3.76190	1.131	.658	.913
One8	I would be very unhappy without nature in my life.	3.70476	1.134	.486	.918
One9 recode	I have never felt like I truly belong in nature.	3.68571	1.077	.433	.920
One10 recode	Spending time in nature is not my idea of fun.	3.64762	1.083	.666	.912
One12	I feel all inhabitants of Earth, human and non-human, share a common 'life force.	3.23810	1.173	.703	.911
One13	I have had really peaceful, merging experiences where I felt one with nature.	3.35238	1.143	.727	.910
One14	I often feel a sense of oneness with the natural world around me.	3.29524	1.028	.741	.910
One15 recode	Humans are more important than animals.	3.15238	1.207	.521	.918
One16	I think of the natural world as a community to which I belong.	3.57143	.929	.588	.915

Note: Oneness items ( $\alpha = 0.919$ ,  $n=104$ )

Table 4-15. Item analysis for remaining oneness items

Item #		Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
One4	To me nature is a friend who's always there.	3.30	.980	.748	.900
One5	I feel a deep connection toward nature.	3.42	1.026	.776	.898
One6	I am connected to nature much like I'm connected to my family.	2.68	1.156	.729	.901
One7	I do not feel connected to nature.	3.76	1.131	.579	.912
One10	Spending time in nature is not my idea of fun.	3.65	1.083	.581	.911
One12	I feel all inhabitants of Earth, human and non-human, share a common 'life force.	3.24	1.173	.709	.903
One13	I have had really peaceful, merging experiences where I felt one with nature.	3.36	1.143	.788	.897
One14	I often feel a sense of oneness with the natural world around me.	3.30	1.028	.794	.897
One16	I think of the natural world as a community to which I belong.	3.57	.929	.606	.909

Note: Oneness items ( $\alpha = 0.913$ ,  $n=104$ )

Table 4-16: Item analysis for identity items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Id1	When I'm out in nature, I feel like I can be my true self.	3.47	.955	.660	.946
Id2	I am a nature-lover.	3.39	1.118	.798	.942
Id3	I want nature to be a part of my everyday life.	3.66	.951	.726	.944
Id4	My feelings toward nature have influenced my career choice.	2.62	1.233	.655	.947
Id5	Nature helps me find meaning in my life.	3.10	1.048	.737	.944
Id6	I am an environmentalist.	2.81	1.115	.728	.944
Id7	My feelings toward nature form a big part of my identity.	2.80	1.092	.849	.940
Id8	Nature is a huge part of who I am.	2.83	1.242	.879	.939
Id9	I feel this call or need to be around nature as much as possible.	2.77	1.072	.820	.941
Id10	I couldn't live somewhere where I had little contact with nature.	3.47	1.114	.675	.946
Id11	My love for nature is a big influence in my life.	3.00	1.174	.877	.939
Id12	I am more comfortable in nature than in a city.	3.18	1.113	.658	.946

Note: Identity items ( $\alpha = 0.948$ ,  $n=104$ )

Table 4-17: Item analysis for remaining identity items

Item #	Item	Mean	Std Dev	Corrected Item-Total Correlation	Alpha if Item Deleted
Id2	I am a nature-lover.	3.39	1.118	.755	.935
Id4	My feelings toward nature have influenced my career choice.	2.62	1.233	.680	.940
Id5	Nature helps me find meaning in my life.	3.10	1.047	.718	.937
Id6	I am an environmentalist.	2.81	1.115	.744	.936
Id7	My feelings toward nature form a big part of my identity.	2.80	1.091	.857	.930
Id8	Nature is a huge part of who I am.	2.83	1.242	.882	.928
Id9	I feel this call or need to be around nature as much as possible.	2.77	1.072	.813	.932
Id11	My love for nature is a big influence in my life.	3.00	1.174	.869	.929
Id12	I am more comfortable in nature than in a city.	3.18	1.113	.655	.941

Note: Identity items ( $\alpha = 0.941$ ,  $n=104$ )

Table 4-18. Participant demographics

		Frequency	Percent
Gender	Male	174	32.9
	Female	355	67.1
Ethnicity	African American	45	8.5
	Asian	12	2.3
	Caucasian	405	76.6
	Hispanic	42	7.9
	Mix	19	3.6
	Over 25	25	4.9
Age	18-20	135	25.6
	21-22	286	54.1
	23-25	76	14.3
	Over 25	25	4.9
Area grew-up	Urban	383	71.7
	Rural	137	25.7

Table 4-19. Outdoor recreation participation

Activity	Frequency	Percent
Wildlife watching	128	24
birding	14	2.6
Nature appreciation	204	38.2
gardening	114	21.3
Day hiking	202	37.8
backpacking	106	19.9
camping	271	50.7
Kayaking/canoeing	230	43.1
hunting	52	9.7
fishing	258	48.3
ORV's	20	3.7
Motor boating	212	39.7

Table 4-20. Self-reported average hours participation in outdoor recreation per month

Number of hours	Frequency	percent
0	22	4.1
1-5	221	41.4
6-10	130	24.3
11-15	55	10.4
16-20	34	6.4
21-30	24	4.4
31-50	14	2.7
51-100	13	2.4
101-200	3	0.6

Table 4-21. Political party

Party	Frequency	Percent
constitution	2	.4
Democrat	210	39.3
Green	3	.6
Independent	74	13.9
Libertarian	18	3.4
republican	214	40.1

Table 4-22. Degree of conservatism

Response	Frequency	Percent
Very conservative	55	10.3
Somewhat conservative	167	31.3
Neutral/independent	109	20.4
Somewhat liberal	140	26.5
Very liberal	58	11

Table 4-23. Data set A: Mean scores, standard deviations, and skewness and kurtosis values for 47 CTN scale items (n=248)

Item	M	SD	Skewness	Kurtosis
Awe4	3.63	.93	-.44	-.26
Awe6	3.55	.83	-.34	-.24
Awe7	3.60	.86	-.52	.13
Awe8	3.10	.94	-.12	-.46
Awe10	3.79	.78	-.92	1.56
Awe13	3.75	.84	-.49	-.03
Ap2	3.92	.73	-.57	.88
Ap4	3.86	.75	-.51	.24
Ap6	3.93	.64	-.60	1.25
Ap7	3.83	.82	-.56	.02
Ap12	3.54	.78	-.64	.00
Car3	3.73	.76	-.34	-.09
Car4	2.50	.82	.55	.12
Car5	3.15	.86	.16	-.31
Car6	3.06	.94	.12	-.65
Car9	2.82	.90	.10	-.39
Fear3	2.07	.97	.89	.26
Fear5	2.21	.95	.78	.20
Fear6	2.35	1.03	.52	-.66
Fear7	2.29	1.07	.67	-.31
ID7	2.52	.97	.60	-.23
ID8	2.73	.94	.39	-.07
ID9	2.71	.94	.40	-.24
ID11	2.79	.91	.55	-.14
One4	2.88	.96	.17	-.56
One5	3.19	.87	-.06	-.26
One6	2.43	.97	.44	-.39
One13	3.01	.98	-.02	-.70
One14	2.91	.90	.05	-.45
P1	3.27	.83	-.20	-.55
P4	3.54	.81	-.49	-.16
P5	3.50	.77	-.49	-.08
P6	3.49	.87	-.53	-.18
P7	3.56	.80	-.63	.24
P10	3.28	.93	-.34	-.46
Sor1	3.68	.81	-.59	.63
Sor5	2.97	.92	.03	-.36
Sor7	3.82	.86	-.42	-.18
Sor8	3.60	.89	-.42	-.07
Sor9	3.47	.91	-.41	-.26
Sor10	3.50	.96	-.10	-.69

Table 4-23. Continued

Item	M	SD	Skewness	Kurtosis
Spirit2	2.65	1.09	.27	-.69
Spirit6	2.70	1.06	.11	-.81
Spirit7	2.94	1.03	-.12	-.64
Spirit8	2.83	1.05	.13	-.58
Spirit10	2.53	1.06	.31	-.76
Spirit12	2.73	1.06	.14	-.67

Table 4-24. Data set B: Mean scores, standard deviations, and skewness and kurtosis values for 47 CTN scale items

Item	M	SD	Skewness	Kurtosis
Awe4	3.43	.95	-.46	-.36
Awe6	3.4	.91	-.36	-.26
Awe7	3.50	.93	-.52	-.13
Awe8	2.93	.99	-.07	-.81
Awe10	3.61	.88	-.77	.47
Awe13	3.68	.92	-.70	.37
Ap2	3.77	.83	-1.07	1.77
Ap4	3.69	.85	-.76	.88
Ap6	3.78	.82	-1.17	1.88
Ap7	3.70	.86	-.74	.96
Ap12	3.42	.85	-.67	.04
Car3	3.63	.84	-.69	.59
Car4	2.53	.94	.36	-.34
Car5	3.07	.85	-.17	-.25
Car6	2.87	.95	-.07	-.66
Car9	2.74	.92	.18	-.46
Fear3	2.30	1.06	.80	.05
Fear5	2.44	1.09	.48	-.65
Fear6	2.48	1.16	.59	-.50
Fear7	2.55	1.21	.53	-.71
ID7	2.51	.94	.28	-.44
ID8	2.66	.95	.30	-.39
ID9	2.62	.94	.33	-.39
ID11	2.67	.92	.38	-.14
One4	2.88	.95	-.01	-.40
One5	3.06	.88	-.06	-.34
One6	2.42	.95	.40	-.32
One13	3.04	.99	-.35	-.60
One14	2.90	.93	-.10	-.54
P1	3.16	.89	-.26	-.39
P4	3.38	.88	-.77	.22
P5	3.44	.90	-.54	-.19
P6	3.36	.95	-.59	-.19
P7	3.46	.89	-.82	.66
P10	3.09	.99	-.26	-.64
Sor1	3.47	.92	-.56	.15
Sor5	2.94	.96	-.11	-.52
Sor7	3.60	.93	-.70	.45
Sor8	3.53	.92	-.51	.07
Sor9	3.40	.95	-.28	-.36
Sor10	3.37	1.01	-.34	-.49

Table 4-24. Continued

Item	M	SD	Skewness	Kurtosis
Spirit2	2.60	1.00	.19	-.68
Spirit6	2.59	.98	.12	-.79
Spirit7	2.87	1.02	-.20	-.78
Spirit8	2.66	1.00	.02	-.67
Spirit10	2.48	1.01	.32	-.60
Spirit12	2.56	.98	.24	-.54

Table 4-25. Exploratory factor analysis results: Factor, Cronbach's alpha and factor loadings for CTN items

Factor	$\alpha$	Item	Item Description	Loading
Factor 1: Spirituality	.93	Spir6	Nature provides me with a spiritual connection.	.947
		Spir8	Communing with nature is a great form of spirituality.	.919
		Spir2	I have spiritual feelings that are nature-based.	.760
		Spir10	My feelings for nature have influenced my spiritual beliefs.	.713
		Spir12	Without nature I would feel a spiritual void.	.672
		Spir7	Feeling part of nature is a spiritual experience.	.664
Factor 2: Fear	.88	Fear6	Hiking in the wilderness would make me nervous.	.820
		Fear5	A lot of nature just scares me.	.807
		Fear3	I have too much fear of nature to go camping.	.793
		Fear7	If I went hiking, I would be too afraid of all the bugs and snakes to enjoy myself.	.787
Factor 3: Awe	.84	Awe13	The power of nature is just incredible.	.751
		Awe7	The magnitude of nature is awe inspiring.	.751
		Ap7	Nature is like a great gift.	.646
		Awe10	I have seen things in nature that were so amazing; they just filled me with awe.	.510
		Awe8	Aspects of nature have overwhelmed me with emotion.	.421
		Awe6	Watching wildlife fills me with awe.	.412
Factor 4: Sorrow	.86	Sor7	The rate at which people are devouring nature is tragic.	-.808
		Sor10	I feel sorrow because we're destroying too much nature.	-.766
		Sor8	It is upsetting when people want to sweep environmental problems under the rug.	-.698
		Sor9	When people don't think about the long term impacts of their actions on nature it upsets me.	-.590
		Sor5	Seeing how much nature is being destroyed affects me emotionally.	-.528
		Sor1	I regret the negative impacts I have on nature.	-.516
Factor 5: Identity	.91	Id7	My feelings toward nature form a big part of my identity.	.775
		One6	I am connected to nature much like I'm connected to my family.	.613
		Id11	My love for nature is a big influence in my life.	.603
		Id8	Nature is a huge part of who I am.	.561
		Id9	I feel this call or need to be around nature as much as possible.	.528
		One14	I often feel a sense of oneness with the natural world around me.	.402
Factor 6: Restoration	.80	P5	When I'm alone in a natural area, I have this feeling of complete calm.	.748
		P7	When surrounded by nature, I feel at peace.	.648
		P6	Listening to the wind go through the trees calms my mind.	.490
		P4	Time in natural areas breaks down all the stress until I feel completely refreshed.	.437

Notes: Extraction method: Maximum likelihood. Rotation method: Oblimin with Kaiser normalization. Items P1 and Car9 had cross loadings and items One4, One5, P10 and Ap10 did not load and were left out of the table.

Table 4-26. Confirmatory factor analysis results: Factor loadings, critical ratios (C.R.), Cronbach's alpha and AVE for CTN Items

Factor	Item Description (item number)	Loading	CR	$\alpha$	AVE
Factor 1: Spirituality	I have spiritual feelings that are nature-based. (Spir2)	.80		.91	.70
	Nature provides me with a spiritual connection. (Spir6)	.86			
	Feeling part of nature is a spiritual experience. (Spir7)	.85			
	My feelings for nature have influenced my spiritual beliefs. (Spir10)	.84			
Factor 2: Awe	Watching wildlife fills me with awe. (Awe6)	.76		.87	.63
	The magnitude of nature is awe inspiring. (Awe7)	.86			
	I have seen things in nature that were so amazing; they just filled me with awe. (Awe10)	.77			
	The power of nature is just incredible. (Awe13)	.78			
Factor 3: Sorrow	Seeing how much nature is being destroyed affects me emotionally. (Sor5)	.75		.86	.61
	It is upsetting when people want to sweep environmental problems under the rug. (Sor8)	.77			
	When people don't think about the long term impacts of their actions on nature it upsets me. (Sor9)	.82			
	I feel sorrow because we're destroying too much nature. (Sor10)	.78			
Factor 4: Identity	My feelings toward nature form a big part of my identity. (Id7)	.76		.89	.56
	Nature is a huge part of who I am. (Id8)	.86			
	My love for nature is a big influence in my life. (Id11)	.82			
	I am connected to nature much like I'm connected to my family. (One6)	.73			
	I often feel a sense of oneness with the natural world around me. (One14)	.75			
Factor 5: Restoration	When I need to relax, I spend time in nature. (P1)	.72		.86	.56
	Time in natural areas breaks down all the stress until I feel completely refreshed. (P4)	.71			
	When I'm alone in a natural area, I have this feeling of complete calm. (P5)	.73			
	Listening to the wind go through the trees calms my mind. (P6)	.73			
	When surrounded by nature, I feel at peace. (P7)	.83			
Factor 6 Fear	Hiking in the wilderness would make me nervous. (F6)	.89		.89	
	A lot of nature just scares me.(F5)	.74			
	I have too much fear of nature to go camping.(F3)	.76			
	If I went hiking, I would be too afraid of all the bugs and snakes to enjoy myself. (F7)	.90			

Table 4-27. Results of the most parsimonious measurement and structural model test (minus four items)

Model	$\chi^2$	<i>df</i>	$\chi^2/df$	P	RMSEA (90% CI)	SRMR	TLI	CFI
Measurement model Test of the items	556.89	284	1.96	.000	.061 (.053-.068)	.053	.93	.94
2 <sup>nd</sup> Order Model Test of the overall model	630.98	293	2.15	.000	.066 (.059-.074)	.073	.91	.92

Note. RMSEA = root mean square error of approximation; NFI = normed fit index; TLI = Tucker-Lewis Index; CFI = comparative fit index  $p < .00$

Table 4-28. Results of the measurement and structural model test

Model	$\chi^2$	<i>df</i>	$\chi^2/df$	P	RMSEA (90% CI)	SRMR	TLI	CFI
Measurement model Test of the items	800.3	390	2.05	.000	.063 (.057-.070)	.057	.91	.92
2 <sup>nd</sup> Order Model Test of the overall model	884.49	399	2.22	.000	.068 (.062-.074)	.076	.90	.91

Note. RMSEA = root mean square error of approximation; NFI = normed fit index; TLI = Tucker-Lewis Index; CFI = comparative fit index  $p < .00$

Table 4-29. Correlations matrix for the 6 dimensions

	Spirituality	Awe	Sorrow	Identity	Restoration
Spirituality	1.000				
Awe	.530	1.000			
Sorrow	.476	.666	1.000		
Identity	.749	.607	.600	1.000	
Restoration	.592	.774	.625	.767	1.000
Fear	.012	-.268	-.143	-.195	.323

Table 4-30. Correlations for convergent validity and CTN

	CNS	Role Identity	Self Identity	Universalism	Benevolence
Identity	.752**	.689**	.770**	.295**	-.092
Awe	.535**	.555**	.429**	.413**	.111
Restoration	.568**	.652**	.513**	.289**	.066
Spirituality	.583**	.451**	.611**	.305**	-.015
Sorrow	.627**	.545**	.627**	.516**	.173*
Fear	-.099	-.304**	-.174	-.043	-.057

Note: \*\*Correlation is significant at the 0.01 level (1-tailed). \*Correlation is significant at the 0.05 level (1-tailed).

Table 4-31. Correlations for discriminant validity and CTN dimensions

	Power	Achievement	Social Desirability	Egoistic Concerns
Identity	-.137	.136	-.088*	-.083
Awe	-.070	.167*	-.010	.024
Restoration	-.157	-.009	-.037	.074
Spirituality	-.129	-.119	-.059	-.035
Sorrow	.023	.062	.027	.091
Fear	.084	-.050	.032	.120

Note: \*Correlation is significant at the 0.05 level (1-tailed).

Table 4-32. Correlations between CTN dimensions and forms of environmental concern

	Biospheric	Socioaltruistic	Egoistic	NEP
Identity	.437**	.070	-.083	.221*
Awe	.362**	.200*	.024	.231**
Restoration	.355**	.164*	.074	.209*
Spirituality	.306**	.122	-.035	.144
Sorrow	.425**	.235**	.091	.643**
Fear	-.023	.068	.120	-.136

Note: \*\*Correlation is significant at the 0.01 level (1-tailed). \*Correlation is significant at the 0.05 level (1-tailed).

Table 4-33. Exploratory factor analysis results: Factor, Cronbach's alpha and factor loadings for ERB items

Factor	$\alpha$	Item Description	Loading
Factor 1: civic	.90	1. Discuss environmental issues with others.	.914
		2. Stay informed about environmental issues.	.923
		3. Support wildlife and or other environmental groups and causes	.801
		4. Voted for a politician based on their record for protecting the environment.	.743
		5. Stop buying from a company that shows a disregard for the environment	.510
Factor 2: 3 R's	.79	6. Reduce buying unnecessary goods.	.648
		7. Buy recycled paper products such as paper towels, toilet tissue, and printer paper.	.612
		8. Purchase items that have less packaging.	.679
		10. Reuse items such as plastic bags.	.569
		11. Replace incandescent light bulbs with florescent bulbs	.419
Factor committed	.76	12. Buy shade-grown coffee.	.872
		13. Write letters to legislators urging them to support environmental issues.	.861
		14. Stop using pesticides in my yard or home.	.550
		15. Compost food scraps.	.488

Notes: Extraction method: Maximum likelihood. Rotation Method: Oblimin with Kaiser normalization.

Table 4-34. Stepwise regression for predicting the 3R's ERB from CTN

		<i>B</i>	<i>SE B</i>	$\beta$
Step 1				
	Constant	.98	.43	
	Restoration	.56	.12	.41**
Step 2				
	Constant	.94	.42	
	Restoration	.35	.15	.26*
	Identity	.27	.12	.25*

Note:  $R^2 = .17^{**}$  for step1;  $\Delta R^2 = .04^*$  for step 2. \*\*  $p < .001$ , \*  $p < .05$

Table 4-35. Hierarchical regression for predicting civic ERB from CTN

		<i>B</i>	<i>SE B</i>	$\beta$
Step 1				
	Constant	-.62	.39	
	Sorrow	.84	.11	.61**
Step 2				
	Constant	-.94	.39	
	Sorrow	.68	.12	.49**
	Identity	.32	.11	.25*

Note:  $R^2 = .37^{**}$  for step1;  $\Delta R^2 = .05^*$  for step 2. \*\*  $p < .001$ , \*  $p < .05$

Table 4-36. Hierarchical regression for predicting the committed ERB's from CTN

		<i>B</i>	<i>SE B</i>	$\beta$
Step 1				
	Constant	.73	.25	
	Identity	.30	.09	.33*
Step 2				
	Constant	1.51	.37	
	Identity	.43	.10	.46**
	Awe	.31	.11	.29*

Note:  $R^2 = .33^*$  for Step1;  $\Delta R^2 = .06^*$  for Step 2. \*\*  $p < .001$ , \*  $p < .05$



Figure 4-1. Second-order factor model

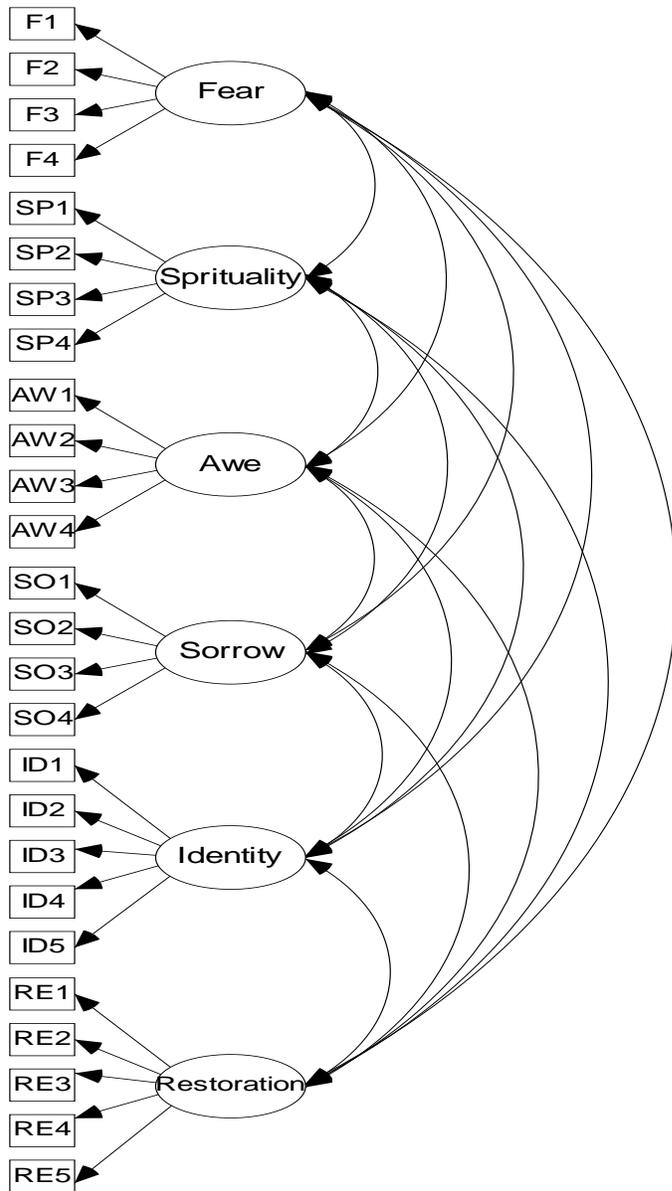


Figure 4-2. The measurement model

## CHAPTER 5 DISCUSSION

The purpose of this study was to define the connection to nature construct and develop a representative scale. The qualitative study conducted to define the construct, revealed nine themes (Table 5-1) that describe people's connection to nature. These nine themes are related to the five that were found in common from the dissertations detailed in chapter 2 (Beyer, 1999; Doran, 2002; Dowdall, 1998; Dufrechou, 2002; Martin, 2002; Reist, 2004; Snyder, 1989). The five themes discussed in chapter 2 were: awe, appreciation, reciprocity, restoration and oneness. These themes were found along with an additional four themes including an identity theme, fear, spirituality and sorrow. Additional themes were likely found because of the nature and purpose of the interview questions. In this study, unlike others, specific questions were designed to uncover the various aspects and range of feelings associated with a personal relationship with nature.

Many of these nine themes had been found in previous studies investigating outdoor recreation experiences including tranquility and fascination (Kaplan & Talbot, 1983); connection and awe (DeMares & Krycka, 1998); diminutive (e.g. humility, insignificance, awe), deep flow (e.g. effortless attention, timelessness, oneness, tranquility), transcendent experiences (similar to oneness and spirituality), aesthetic experiences (similar to appreciation) and restorative experiences (similar to tranquility).

Like the qualitative works previously discussed, this study also found evidence of a pattern of progression toward a relationship with nature. Although a grounded theory analysis was not the intent of the qualitative research in this study and further analysis and more data would be needed to use these results for grounded theory, findings were in line with previous work. The less experience people had with nature, the less they could relate to nature. Their views were

more utilitarian and they had a marked fear or aversion to nature. These results are similar to the qualitative works of Beyer (1999), Martin (2002) and Reist (2004) discussed in Chapter 2. Just as Bixler and colleagues (Bixler, 1994; Bixler & Floyd, 1997) found those who felt fear and disgust for nature had had little preference for wildland environments and recreation, this study also found that low levels of experience and preferences were tied to fear.

Although, this study did not ask about materialism and consumerism, findings were similar to Reist's (2004), who found those high in fear and disgust to be more materialistic. For example, interviews showed those high in fear preferred to shop or get a manicure when they needed to relax. As people gained experience with nature and felt more comfortable in nature, a caring for nature and desire to reciprocate and live more in harmony with the environment emerged. With more experience, especially emotional or quiet reflective time in nature, care deepens (Beyer, 1999, Martin, 2002). Finally as care continues to deepen, one becomes integrated with nature and feels truly connected to nature as nature becomes a core aspect of self (Beyer, 1999; Martin, 2002; Reist, 2004). Martin (2002) calls these stages alienated from nature, traveling through nature, caring for nature and integrated with nature.

However, unlike Chawla and others, this study did not find that a connection to nature or a caring attitude toward the environment necessarily resulted from experiences in natural areas during childhood and family role models during childhood (Chawla, 1998, 1999; Finger, 1994; Kals, Schumacher, & Montada, 1999; Sia, Hungerford, & Tomera, 1986; Sivek & Hungerford, 1989; Wells & Lekies, 2006). The interviews found a number of people whose interest developed in adulthood. Women in particular often did not have an interest in outdoor pursuits or the environment until a partner or spouse influenced them. Others became inspired from a new leisure activity, such as mountain biking. And even for those whose interest stemmed from

childhood, several described it as an innate calling that was always felt, despite the lack of interest from family, friends or nature-based experiences. Several participants also credited books or nature television.

These results, although in contradiction with much of the literature (Chawla, 1998 and 1999; Swan, 1992), are some of the most promising. As environmental education research often focuses on youth education (e.g. camps, fieldtrips, formal and informal educational programs) (Chawla, 1998, 1999; Palmberg & Kuru, 2000; Sobel, 1996) in part because of the research mentioned above stating that people need significant experiences in youth to form a commitment. Yet, as environmental issues and the loss of natural areas become more acute, it is important to not only to focus on youth and those who are already committed to natural area visitation and conservation, but to get others connected to nature as well. After all, nature-based experiences have many benefits, both psychological and physical (Driver & Ajzen, 1996; Herzog, Black, Fountaine, & Knotts, 1997; Kaplan, 1995; Kaplan & Talbot, 1983; Muloin, 1998; Roggenbuck & Driver, 2000; Roggenbuck, Loomis, & Dagostino, 1990; Schroeder, 1996; Ulrich, 1983; Wohlwill, 1983). The fact that adults can be inspired to care for nature and the environment is good news for nature-based tourism venues, organizations concerned with natural history education and environmental educations such as parks, zoos, museums and nature centers.

Further encouragement for introducing nature at a later life stage and even teaching a connection to nature comes from several other studies. Barrie (2002) found interpretive experiences in parks and museums were very meaningful, some of which are remembered many years later. Doran (2002) successfully fostered a connection to the earth for 11-14 year-olds during a 7-week after-school program. Feelings of connection were described while gardening,

driving out of a storm, floating in the ocean, watching a songbird in the backyard, playing music in a backyard and gazing at a houseplant (Beyer, 1999; Dowdall, 1998). Encounters in nature and with animals were felt as peak connecting experiences (Dowdall, 1998; Vining, 2003; Williams & Harvey, 2001).

### **Scale Development**

The nine themes from the qualitative results were used to create a scale. Items for these themes were created and tested. Exploratory and confirmatory factor analysis resulted in a final scale containing six dimensions (see Table 5-1). All six dimensions had reliable scales and the internal structure of the scale demonstrated convergent and discriminant validity. This work shows that unlike previously developed scales by Meyers and Frantz (2004) and Clayton (2004), Connection to Nature (CTN) is a multi-dimensional construct. This work concurs with previous qualitative work exploring aspects of connection experiences similar to CTN. It is also in agreement with preliminary scale work by Pennisi and Pennington-Gray (2007b).

Several of the initial nine themes did not factor during the exploratory analyses. These were appreciation and caring. It was felt that appreciation was a general feeling toward nature that even people with little regard or connection would feel. After all, we all appreciate the food, water, air and shelter that nature provides. Also, most will enjoy the beauty of scenery such as sunsets. The caring theme was much about behavior and likely would not achieve significant results with a college student sample. However, these types of questions are likely better asked by a separate scale that asks about behavior such as the ERBI that was modified for use here. The identity and oneness themes merged which made conceptual sense. The fear theme had a negative correlation with the other themes as being fearful from nature is expected to be opposite a connection to nature. However, fear was left in for several reasons: 1) fear helps to provide a range of how a person's level of connection, 2) fear helps to balance the many positive items on

the scale. Leaving the fear theme also did not significantly alter model fit. Eliminating appreciation, caring, fear and combining identity and oneness resulted in six themes or a six-dimensional construct.

Evidence of convergent, divergent and predictive validity was obtained. In terms of convergent validity, CTN was found to be highly correlated with Mayer's and Frantz's similar connectedness to nature (CNS) scale (Mayer & Frantz, 2004b) and measure of role identity and self-identity as expected. However, it was not found to be correlated with universalism and benevolence values as hypothesized. This could be due to the nature of the sample. The sample was young, consisting mainly of freshman or sophomore University students, and values are generally not set until the mid to late twenties (Schwartz, 1992). Rather, college is a time when values, and therefore self-identity, become more established (Hitlin, 2003). Values were tested with other samples at the same university and the students were found to be low in self-transcendence and high in hedonism (Lee & Trail, 2006). In this sample, hedonism was not measured, however, the highest ratings were for benevolence ( $\bar{x} = 7.39$ ), followed by achievement ( $\bar{x} = 7.22$ ), then universalism ( $\bar{x} = 6.52$ ) and power had the lowest mean at 5.15.

For this sample, the value items related to nature were rated low. Among the nine items measuring universalism, "Unity with Nature (fitting into nature)" had the lowest mean, followed by protecting the environment and a world of beauty (beauty of nature) respectively. The means for identity/oneness items were also low in comparison with the other domains. Therefore this sample is low in nature-related values and identity/oneness with nature. Since this sample all comes from the millennial generation, this could be a characteristic of this cohort. The millennial generation is said to be heroic, collegial and tolerant with core values related to community, technology and affluence (Lancaster & Stillman, 2003; Strauss & Howe, 1991). The self-

transcendent values of benevolence and universalism and the self-enhancement value of achievement generally fit with the generational description. But in terms of low scores on values related to nature, this generation's defining moments include the rapid expansion of the internet and safety concerns over violence (Strauss & Howe, 1991). They are the first generation, characterized by spending little free-time playing outdoors. Rather, this generations' childhood was dominated by video games and computers, making them likely to suffer from "nature-deficit disorder" (Louv, 2005). Finally, in terms of discriminant validity, CTN had low correlations with the self-enhancement values of power and achievement, social desirability and egoistic concerns as expected.

The CTN scale demonstrated evidence of discriminant validity. There was a lack of correlation between CTN dimensions and the dissimilar self-enhancement values of power and achievement. Correlations between CTN dimensions and egoistic concerns and social desirability were all low as hypothesized.

### **Connection to Nature and Environmentally Responsible Behaviors**

Connection to nature (CTN) also showed evidence of predictive validity, as CTN successfully predicted three dimensions of environmentally responsible behaviors (ERB). However, here the results were not that simple. The identity dimension was a significant predictor (17% of variance) of the 3R's such as reducing, reusing and buying recycled products. This was expected because a personal identity tied to nature should result in protective behaviors (this will be explained further). Restoration was also a significant predictor of the 3R's but to a much lesser degree (.5%). Restoration as a predictor is not as readily apparent as identity. However, if you receive benefits from a nature-based activity, it should follow that you would want to protect nature, especially if it is a nonconsumptive activity that would promote

restoration (Dunlap & Heffernan, 1975; Palmberg & Kuru, 2000; Tarrant & Green, 1999; Thapa & Graeffe, 2003; Theodori, Luloff, & Willits, 1998).

For supportive ERB's such as voting and staying informed about issues, sorrow was the most significant predictor and identity, although significant, did not predict much variation in supportive ERB's (37% and .5% respectively). For committed ERB's, such as writing letters and composting, identity was the most significant predictor and awe showed a significant but negligible effect (11% and .6%, respectively). Therefore, for this data set, four of the five dimensions showed predictive ability for ERB. Spirituality did not show predictive validity for the ERB questions asked. This may be indicative of this sample's low spirituality scores. Although, spirituality may be a better predictor of other behaviors, particularly seeking solitude in nature or in wilderness (Fredrickson & Anderson, 1999; Heintzman, 2003).

Identity was the most important predictive dimension for two of the three types of behavior looked at in this study: the 3R's and committed behaviors; whereas sorrow predicted more of the supportive behaviors. This makes sense since both the 3R's and committed behaviors were actual behaviors that may be performed regularly. If a behavior is performed regularly, it is likely that it is associated with identity; either role identity (such as a behavior associated with a central role such as parent), or with personal identity (such as music lover or sports fan). In previous research, identity increased the prediction of behavioral intentions, including green consumerism, regardless of attitudes (Charng et al., 1988; Sparks & Shepherd, 1992). Identity's predictive power was thought to be related to the strength of the role identity in terms of an established behavior (Charng et al., 1988). That is, an established role as a volunteer would make identity a stronger predictor than a new role as volunteer for a first time volunteer (Charng et al., 1988). However, Sparks and Shepard (1992) found that self-identity's power of prediction

remains when past behavior is taken into account. The strength of prediction for identity independent of attitudes may be due to the value-based or ethical component of self-identity and the affective component of self-identity and values (Hitlin, 2003; Sparks & Shepherd, 1992). This certainly should apply to the identity aspect of CTN.

The supportive behaviors, including voting, discussing, staying informed, not buying from companies that show a disregard for the environment (boycotting) and supporting groups and causes, are inline with many of the polls indicating people express concern about the environment but actually do little in terms of environmentally responsible behaviors. Also, environmental knowledge is also shown to be low in these polls, indicating that perhaps people are at least superficially aware and concerned, but their concern equals little more than small gestures or tokenism (Jurin & Fortner, 2002). This is a rather cynical view, however, and there are other possible explanations, including that gloom and doom messages often portrayed by environmentalists induce helplessness (Kaplan, 2000; Vasi & Macy, 2003). When people feel like they cannot make a difference and the situation is hopeless, they are less likely to participate in ERB (Kaplan, 2000), but they may still express concern.

### **Connection to Nature: A Six-dimensional Construct**

The validity evidence shows strong support for the scale that was developed. Therefore, the evidence of a six-factor definition of the CTN construct is also supported. These six dimensions which are awe, tranquility, identity, fear, sorrow and spirituality, illustrate a range of aspects related to having a relationship with nature. Appreciation did not factor in any of the tests of the items. This is likely due to appreciation being a very general concept. That is most people, even those who fear nature, have some appreciation for it. The appreciation for the beauty of a sunset or certain landscapes is nearly universal (Kellert & Wilson, 1993) and most people can appreciate our dependence on nature or at least aspects of it such as clean air and water. Caring

or reciprocity also did not factor. This may be due to the fact that there is such a variety of ways to give back or care that it is hard to measure in a few questions. This dimension is likely better covered by separate behavioral questions, such as the ERBI scale which was modified for use in this study. Finally, the oneness and identity dimensions converged which makes sense. These two themes are related. Feelings of oneness result in a connected self-identity.

Tranquility is characterized by feelings of peace and calm experienced in nature. People may spend time in natural areas for the calming, refreshing and rejuvenating effects it has on them both physically and mentally. When stressed, people may seek nature as a way to decompress, ease anxiety and tension and feel restored. When tranquility in nature is experienced, especially during periods of solitude, it seems to facilitate spiritual, mystical or transcendent experiences (Fredrickson & Anderson, 1999; Heintzman, 2003). Restoration is an important aspect of nature-based experiences, necessary for psychological well being. True restoration is more likely to occur in nature, as time for reflection is a necessary for leisure activities to lead to restoration (Kaplan, 1995; Kaplan & Kaplan, 1989; Kaplan & Talbot, 1983).

Awe describes powerful emotions of amazement and wonder. Awe was felt when viewing wildlife, contemplating or experiencing the power or magnitude of nature. Awe is related to connection because it can facilitate humility and oneness experiences. Also, those who were highly connected experienced awe in everyday or urban nature experiences such as watching insects or birds or contemplating the life of a plant. Experiences of awe are commonly found in wilderness and in wildlife encounters (DeMares & Krycka, 1998; Heintzman, 2003; Vining, 2003). Awe may also lead to powerfully emotional and transcendent experiences (DeMares & Krycka, 1998; Keltner & Haidt, 2003; Vining, 2003).

Identity describes how much self-identity is tied to nature and if a person feels oneness with nature. In this case, the attachment to nature is like attachment to family. Nature forms a large part of the self and is a large influence on life – influencing group and role identities. This aspect of connection to nature is most closely related to deep ecology’s concept of nature as a part of self (Naess, 1995). This is supported by Clayton (2003), who found identity to be tied to relationships with nature and connection to nature.

Sorrow describes the emotions of sadness and grief felt when thinking about the plight of nature. These feelings apply to both the regret of self-inflicted negative impact to the environment and to society’s impact. It is also related to the frustration felt when environmental issues are not properly addressed. Sorrow is likely tied to helplessness and too much sorrow may negatively correlate with behaviors. Sorrow may also be induced not just by seeing the harm done, but also to how issues are depicted in the media. Again, the gloom and doom messages portrayed by environmentalists and in the media is likely to stir these feelings. When seeing pictures of oil-soaked and stricken wildlife on the news, sorrow could even be overwhelming and although it is hoped that action will follow, if the negative feelings are too strong, helplessness may be the more likely response.

Spirituality describes both nature-based spirituality and spiritual feeling that are inspired by spending time in nature. Spirituality is also related to experiences of oneness or mystical or self-transcendent experiences, as these experiences are felt as spiritual and inspire spirituality. Spiritual experiences in nature were found in other studies to be related to solitude and being in true wilderness areas – likely because wilderness, being intrinsically remote, offers more tranquility and the likelihood of solitude (Fredrickson & Anderson, 1999; Heintzman, 2003).

However, in this study and in Snyder's (1989) those connected to nature were able to achieve spiritual experiences in everyday environments, such as home. Wilderness likely facilitates such experiences by providing an environment where the tranquility and solitude needed for some to achieve such states is available, and even to an extent, unavoidable. Consider that other than wilderness and solitude, the other aspect thought of as contributing to spiritual experiences in nature is being in a group (Fredrickson & Anderson, 1999; Stringer & McAvoy, 1992). This is likely because being in a group increases or speeds the feeling of comfort in the wilderness, whereas it would be uncomfortable to go into the wilderness alone even though periods of solitude influence spirituality.

Group camaraderie also leads to a spiritual connection among the participants and people in general (Fredrickson & Anderson, 1999; Stringer & McAvoy, 1992). Take the analogy of church-goers for example, some may need the experience of being in the temple to facilitate spiritual feelings, others the camaraderie of fellow worshippers and yet others, may be so connected to their beliefs, that they feel spirituality in everyday situations outside of church. Although, this study did not find a correlation between spirituality and ERB, the Spiritual Experience Funnel model (Fox, 1999) proposes that spiritually transcendent experiences in wilderness lead to attitude and behavior change. Spirituality is considered to be a hard to define value or benefit of wilderness that needs more study (Driver & Ajzen, 1996; Mannell, 1996).

### **Implications**

There are several broad implications to outdoor recreation and tourism and to conservation psychology from this body of work. In terms of outdoor recreation, CTN is likely a hard to define benefit of wilderness and other nature-based experiences. CTN could be a benefit people seek for nature-based experiences. As such it may benefit managers to evaluate this potential benefit when managing and providing for benefits sought. As a benefit people receive from

nature-based experiences, there are implications to how it is related to other benefits such as the psychological benefits of restoration. Managers could also use the CTN scale to measure the quality of wilderness experiences

CTN is also likely related to sense of place and as such may motivate protective behaviors. In terms of motivation, the sense of oneness and other aspects associated with CTN may also prove to be a significant motivator of ERB as discussed earlier. This has implications to managers who wish to address visitor behavior issues such as depreciative behavior and who wish to encourage ERB whether on site or at home.

Managers can encourage CTN by providing quality wilderness opportunities such as extended stays or even brief experiences. As illustrated in the qualitative works of relationships with nature conducted and discussed here, experience with nature are important in forming a relationship with nature and this relationship leads to a connection. Experience with nature and animals were found to be important in other research in leading to environmentalism. This is not surprising as attitudes formed by direct experience are better predictors of behavior than those formed by indirect experience. In addition, attitudes formed by direct experience are affectively based, while attitudes formed by indirect experience are cognitively based (Millar & Millar, 1996). Indeed, it was found that emotional affinity to nature can often be traced to present and past experiences in nature (Kals et al., 1999). If managers can facilitate CTN experiences and identities then this would be important to the work of informal education and nature-based tourism.

In terms of conservation psychology, models for encouraging environmentally responsible behavior. CTN offers a potentially powerful motivator that is general in nature. Developing and

encouraging CTN at nature based tourism sites that are available to people in urban areas, especially those without access to wilderness may prove very useful. After all, the mission of many of these sites includes encouraging nature appreciation and environmentally responsible behavior both on-site and in general. Behaviors that extend outside of the borders of parks and zoos include recycling at home and at work, composting, using less fuel, purchasing green products and consuming fewer non-green goods. Zoos in particular, have encouraging conservation behavior as an essential aspect of their missions (AZA, 2004; Stoinski, Allen, Bloomsmith, Forthman, & Maple, 2002). However, the effectiveness of zoos in encouraging conservation behavior has not been well documented (Dierking, Burtnyk, Buchner, & Falk, 2002; Stoinski et al., 2002). The use of this scale may facilitate such documentation.

### **Limitations**

The purpose of the qualitative study was a thematic analysis to better define connection to nature. Although the results revealed that nature affiliation can begin in adulthood, contrary to many other studies, especially those of Chawla (1998, 1999, 2001), a thorough understanding of this phenomenon was not achieved by this study.

The quantitative work in this study that resulted in the CTN scale, was limited to a convenience sample of university students, therefore results with other populations, especially older populations may differ. And although the participant response rate was over 90%, the sample population had so little diversity; it likely is not a good representation of students at that particular university. In other words, the results are not generalizable to other populations.

The scale refinement also resulted in deleting several items from the final five themes based on this sample. In replication work, it would be advantageous and strongly recommended to keep these items in the study initially. Factor structure is more readily tested, as it is more stable, with a larger number of items.

## **Suggestions for Future Research**

Suggestions for future research would be to replicate the results of this study to further establish reliability and validity with other samples and populations. Putting the CTN scale in other models of ERB such as Value-Belief Norm Theory and the Theory of Reasoned Action is also needed to establish further predictive validity. However, if CTN is found to increase the predictive variance in these models, to hold real promise for encouraging ERB, precursors of CTN need to be found through grounded theory that reveals how these relationships with nature form. Further quantitative work should also be conducted on the triggers of CTN.

One possible precursor or trigger of CTN is empathy. Empathy makes inclusive identities salient. Triggering self-other inclusion through empathy was found to trigger prosocial behavior or altruism (Cialdini et al., 1997). Schultz (2000) induced feelings of empathy by asking participants to take the perspective of a distressed animal and found that empathy increased biospheric concern. Although identity and feelings of oneness were not measured, taking perspective and feeling empathy may have made salient participants' interconnectedness with nature, by expanding their inclusiveness of self. Scholars should examine if connection to nature can be inspired or triggered by empathy. Therefore, a suggestion for future research would be to trigger empathy and measure whether empathy does make CTN salient. Also, does making CTN salient by triggering empathy result in a corresponding increase in concern and intentions to act. One possibility for such research is through empathy inducing interpretive messages at nature-based tourism venues such as parks, zoos and museums.

Practical implications for the use of this scale would be to see what activities have the possibility to increase connection. Do direct experiences with wildlife during educational or tourism experiences lead to an increase in connection? And does this potential increase in connection inspire environmentally responsible behavior? In preliminary research by Pennisi and

Pennington-Gray (2007a), experiences in a walk-through butterfly aviary did result in an increase in connection and an increase in ERB intentions. This is very promising for nature-based tourism and educational organizations such as parks, zoos, museums and nature centers. In addition, the degree of CTN inspired by different types of exhibits and settings such as planetariums; whale/dolphin watching expeditions, safaris, birding outings, ecotourism lodges, as well as formal and informal environmental education activities in schools and summer camps.

CTN can be used to form a more comprehensive model of ERB. Research adding identity to the Theory of Reasoned Action and the Theory of Planned Behavior showed a substantial and independent effect for identity. Identity had nearly the same predictive variance as attitudes (Charng et al., 1988; Sparks & Shepherd, 1992). Therefore, possibilities of integrating attitudes and identity measures offer potential (Sparks & Shepherd, 1992). In terms of a model for ERB, a more specific identity measure, such as that contained in the CTN scale as well as the other components of CTN, integrated with a specific attitude measures, could result in a much more predictive model for ERB. Perhaps, direct experiences in nature or even instructional messages at nature-based tourism venues can utilize this model and successfully enhance both a person's experience in the natural world, their psychological well-being and the environment by increasing environmentally responsible behavior.

Table 5-1. Connection to nature themes

Initial themes (qualitative)	Themes for final scale
Appreciation	Awe
Awe	Identity/oneness
Caring	Restoration
Fear	Sorrow
Identity	Spirituality
Oneness	Fear
Restoration	
Sorrow	
Spirituality	

APPENDIX A  
INTERVIEW LIST

Table A-1. Males interviewed

Name	Age	S	Race/ ethnicity	Religion	Hunt	Fish	Occupation	Ed	Ecology class	Urban/ rural
Jack	56	M	Caucasian – 1st generation	None	N	N	Grad student	BS, MS	Y	Urban Miami
Joe	29	M	Native American	Longhous e Pagan	N	Y	Environ. Educator	BA		Rural
Allen	41	M	Latino	Agnostic	N	Past	Sales	BS	Y	Urban
Pedro	34	M	Hispanic	Catholic	Past	Avid	Grad student	BS, MS	Y	Urban
Don	31	M	Asian	None Eastern Influence	N	N	Grad Student	B, M		Urban
Carlos	29	M	Hispanic	Pantheist	N	Past	Conserv.	BS	Y	Urban Miami
Luke	39	M	Caucasian	Agnostic	N	N	Grad student	BS MS	Y	urban
Ned	31	M	Black	None	N	N	Zoo keeper and Hotel Desk	HS	Y	Inner city
Miguel	28	M	Hispanic	Christian	N	Y	Professor	PhD	N	Urban Miami
Lou	31	M	Caucasian	None	N	Past	Surveyor	HS	Y	Urban Atlanta
Vinnie	33	M	Caucasian	Christian	N	N	Mechanic	HS	N	NY city

Table A-2. Females interviewed

Name	Age	S	Race/ ethnicity	Religion	Hunt	Fish	Occupation	Ed	Ecology class	Urban/ rural
Emma	31	F	Caucasian	Christian	N	N	Notary	BS	Y	Rural
Nikki	24	F	Caucasian	Christian	N	Y	Grad Student	BS	N	Rural
Hannah	26	F	Caucasian	Christian	N	Y	Vet tech	HS	N	Rural - farm
Jennifer	21	F	Caucasian	Jewish	N	Past	student	in coll	N	Urban - Jax
Amanda	21	F	Caucasian	None	N	N	student	in coll	N	Suburban
Naomi	19	F	Black	None	N	Yes Avid	student	in coll	N	Rural
Nola	46	F	Black	Christian	N	N	Sells granola at farmer's markets	BA	N	Urban - LA
Eva	33	F	Hispanic	None	N	Past	Nurse	BS	Y	Urban - Orlando
Liz	56	F	Caucasian	None	Once	N	Special ed teacher	BS MA	N	Urban
Breanne	28	F	Caucasian	Eastern influence	N	N	Environ educator	BS MS	Y	Urban
Rosella	46	F	Latino	Buddhist	N	N	Waitress, yoga instructor	M	Y	Rural
Debbie	48	F	Caucasian	Christian	Past	Y	Secretary	HS	N	Rural
Lucy	49	F	Caucasian	Christian	Y	Y	Secretary	HS	N	Rural
Wilma	59	F	Caucasian	Christian	Past	Yes	Secretary	HS	N	Rural

## APPENDIX B INTERVIEW GUIDE

Overall research question: What is your relationship with nature?

/\*

1. What nature activities do you now and have you participated in?
  - a. Hunting or fishing?
  - b. Backpacking?
  - c. Camping?
  - d. Hiking?
  - e. Gardening?
  - f. Activities like wildlife watching?
  - g. Canoeing/kayaking?
  - h. Swimming in natural settings?
  - i. Walking to enjoy nature?
2. How much time do you spend in nature activities or natural settings in an average month?
3. What does nature mean to you and your life?
  - a. Does nature shape who you are? If so, how?
  - b. Does it remind you of some aspect of who you are?
  - c. Does it change the way you live your life?
4. How did you first become interested in nature?
  - a. When was this? How old were you?
5. How would you describe your relationship with nature?
  - a. Do you feel part of or one with nature and if yes, how so?
  - b. Do you feel connected to nature and if yes, how so?
6. How does your ethnicity, race or cultural background affect how you feel about nature or your interactions with nature?
7. How do your religious beliefs affect how you feel about nature or your interactions with nature?
8. Can you give me some examples of how your behavior (or daily activities) reflects your relationship/feelings toward nature?
9. Does nature let you express certain behaviors that are important to you and your life?
  - a. Do nature experiences change the way you act in everyday life?
  - b. Are these changes long-lasting?
10. We've been using the term nature throughout our conversation. What does the term nature mean to you? A definition.
  - a. Can you give some examples of things you would and would not consider nature? What is the difference?

11. Describe your most meaningful experiences in or with nature?
  - a. What was it like?
  - b. What is about this experience that makes it stand out?
12. Have you had any traumatic nature experiences? Explain. How did that affect you?
13. When you think of spending time in nature, what feelings come to mind?
  - a. Do you spend time in nature to feel peaceful, relaxed or restored? Please explain.
  - b. When you feel the need to get really relaxed and to rejuvenate yourself what activities come to mind?
14. Do you ever feel deep emotions for nature?
  - a. Describe
  - b. Do these feelings include awe or humility (i.e. feeling part of something larger or feeling small)?
  - c. Do you feel appreciation? If so, please explain.
  - d. Are these feelings confined to special moments or do they occur every day?
15. Do you consider yourself an environmentalist?
  - a. How so? Or please explain.
16. Throughout this conversation, I've been trying to understand your relationship with nature. Given what we've talked about, is there anything else you'd like to add to help me understand the importance of nature to who you are?
17. Is there anything else I should have asked you? Could you answer that question?

APPENDIX C  
ITEM SCALING

**Potential Items by Dimension**

**Restoration/Tranquility**

1. When I need to relax, I often imagine myself out in nature.
2. Nature is a way to escape all the cars, phones and noise.
3. Spending time in nature gives me a chance to reflect and process everything.
4. Listening, being near or being in water is particularly relaxing.
5. I look forward to getting away from the hustle and bustle and spending time in nature.
6. It's complete stress relief to close my eyes and imagine being in my favorite natural area.
7. I love how tranquil nature can be.
8. Natural areas are a great escape.
9. Spending time in nature is a great way to decompress.
10. My source of rejuvenation is nature.
11. I look to nature when I need to relax.
12. Water is very relaxing and rejuvenating.
13. Time in nature allows all the stress to break down, until you're completely at peace.
14. When I'm alone in nature, I have this feeling of complete calm.
15. Listening to the wind going through the trees calms your mind.
16. I enjoy taking nature walks to enjoy the quiet.
17. Nature allows me to lose the complications I'm carrying through life.
18. When surrounded by nature, I feel at peace.
19. Being out in nature, allows me to forget about my worries.
20. When I'm upset it helps to commune with nature.
21. Spending time in nature allows me to leave my anxieties behind.
22. Just watching the birds is so relaxing.
23. Watching wildlife helps me clear my mind.
24. Without nature in my life, I would be much more stressed and tense.
25. Listening to the birds is really peaceful.
26. I'm not comfortable in nature.
27. When I'm hiking I feel carefree, no worries just me and the world.
28. Being in nature is really the best way for me to relax.
29. Nature is a source for me to decompress and recharge my energies.
30. I enjoy just sitting at a lake or stream and looking out on the water.
31. If I couldn't experience natural areas, I'd probably be a lot more moody.

**Awe/Marvel**

1. I have seen sunsets where the colors are truly amazing.
2. When a wild animal allows me to get close or approaches me, it's really like a blessing.
3. Sometimes when I look at the stars I feel really small.
4. I have felt like a small part of a really large world.
5. I have had such memorable experiences in nature.
6. Nature is fascinating.

7. The beauty of nature can be overwhelming.
8. I have seen things in nature that are just so amazing I can't believe they exist.
9. I feel like there's so little we know about nature and so much we need to learn.
10. I have such awe in nature that I was at a loss for words.
11. Even everyday nature experiences fill me with awe.
12. Nature has filled me with wonder.
13. Humans are just a small part of something big.
14. I have been mesmerized by aspects of nature.
15. When I look at the stars I think about how small the earth is and how small I am on the earth.
16. I am often in awe of animals.
17. Hummingbirds are really amazing.
18. Interaction with nature is humbling.
19. Watching wildlife fills me with awe.
20. The magnitude of nature is awe inspiring.
21. It's such an incredible feeling to be close to wildlife.
22. Seeing majestic scenery has overwhelmed me with emotion.
23. The power of nature is just incredible.
24. I find thunderstorms so amazing that I enjoy watching them.
25. Nature can be breathtakingly beautiful.
26. Nature inspires me to think of things bigger than myself.
27. I have been in awe at both how complex and yet simple nature is all at the same time.
28. The grandeur of nature has made me feel insignificant at times.
29. I have seen things in nature that were so amazing; they just filled me with awe.

## **Appreciation**

1. Nature provides me with an opportunity for discovery.
2. I have a respect for nature.
3. I enjoy watching insects.
4. I am grateful for nature's gifts.
5. I appreciate nature.
6. When I look at nature the world makes sense.
7. Nature makes allows me to appreciate a much bigger picture.
8. Without nature, we wouldn't be here.
9. Spending time in nature makes me appreciate life more.
10. I feel a reverence for nature.
11. I appreciate all forms of life.
12. All life forms are an integral part of the web of life.
13. I look forward to spending time in nature.
14. I appreciate the experiences I have out in nature.
15. I am in touch with the values nature provides.
16. I enjoy spending time in nature.
17. I really appreciate just listening to the birds sing.
18. Nature is life a great gift.
19. Nature is really special.

20. Nature should be cherished.
21. I love the simplicity of the outdoors.
22. Being immersed in nature is such a great feeling.
23. I am really attracted to natural settings.
24. I enjoy watching wildlife.
25. I take the time to stop and smell the roses.
26. I admire the beauty of nature.
27. I welcome time spent in nature.
28. The variety in nature is wonderful.
29. I just enjoy experiencing nature.
30. I try to honor nature.
31. Nature brings me great joy.
32. Being out in nature makes me happy.
33. Without nature, there would be no life.
34. Nature is the most important thing all humans have in common with one another.

### **Oeness**

1. I would like to one day live in a natural area, surrounded by nature.
2. I consider myself to be part of nature.
3. One of the things I look forward to the most is spending time in nature.
4. You cannot separate humans from nature.
5. Smelling flowers, hearing animal sounds, and feeling the wind makes me feel connected to nature.
6. To me nature is a friend who's always there.
7. I've had experiences in nature where I've lost my sense of self.
8. Humans are separate from nature.
9. I try to spend time in nature every day.
10. I have been overwhelmed with emotions when in nature.
11. Nature is part of who I am.
12. People are completely dependent on nature.
13. I feel a deep connection toward nature.
14. I am connected to nature much like I'm connected to my family.
15. I have things in my office to remind me of nature.
16. I would have a hard time living in a city where nature was not part of my life.
17. I've had amazing experiences where I felt like part of the trees and everything around me.
18. I feel I have an intimate relationship with nature.
19. I do not feel connected to nature.
20. Spending time in nature is not my idea of fun.
21. I have never felt like I truly belong in nature.
22. I would be very unhappy without nature in my life.
23. People are part of the web of life.
24. I like to commune with animals and plants.
25. I have had really peaceful, merging experiences where I feel one with nature.

## **Sorrow**

1. I feel sorrow because of the rate we're destroying nature.
2. I regret the impacts I have on nature.
3. I wish I could have less of a negative impact on nature.
4. Other people's nonchalant attitudes toward the destruction of nature bothers me.
5. Seeing people destroying nature disturbs me.
6. It is upsetting when people want to sweep environmental problems under the rug.
7. When people don't think about the long term impacts of their actions on nature it upsets me.
8. Sometimes I think I need to do more to help nature.
9. I don't think there's any impact on nature from what I do.
10. I hate to see when they've cut a bunch of trees down to build something.
11. Seeing dead animals in the road is really heartbreaking.
12. In some ways, I have a really sad relationship with nature.
13. Seeing how much nature is being destroyed kind of digs at my soul.
14. It is so depressing to see all the development and realize what we've lost.
15. Seeing the animals suffer from an oil spill is really very sad.
16. The thought of tearing up Alaska to drill oil makes me upset.
17. I get really upset when I see people hurt nature.
18. Sometimes, I think our environmental problems are so vast that it's just hopeless.
19. The rate at which people are devouring nature is tragic.
20. When I think about how much of the wild is gone forever, I get depressed.
21. I wish I could live more in harmony with nature.
22. I wish I could substantially reduce my impact on the environment.
23. I hate to see trash out in nature.
24. It's sad when people don't even make the effort to recycle.

## **Caring Behaviors**

1. I recycle as much as I can.
2. I am very conscious about trying to reduce the amount of electricity I use.
3. I really want to try to protect nature as best as I can.
4. My daily decision making is shaped by my environmental mindset.
5. I try hard to cut down on waste.
6. I have a strong desire to give back to nature.
7. I try to influence others to love and care for nature.
8. I buy organic food to lessen my impact on the environment.
9. Many of my consumer or purchasing decisions are made with the environment in mind.
10. I am careful not to litter in nature.
11. I compost all of my organic waste.
12. I have many routine activities that I do to lessen my impact on nature.
13. I love of nature influences my political views.
14. My concern for the environment influences how I vote.
15. I care about how environmental issues are handled.
16. I try to curb how much I drive.

17. I feel I have a responsibility to care for nature.
18. I support environmental policies.
19. I am careful to properly dispose of hazardous waste.
20. I have been using compact fluorescent bulbs to cut down on energy use.
21. I only recycle when it is available.
22. I think reducing my consumption is one of the most important things I can do to help nature.
23. I try not to waste water.
24. I have volunteered for nature, animal or environmental organizations.
25. I have participated in clean-ups or exotic plant round-ups.
26. It really feels good to help nature and wildlife.
27. Conservation is always on my mind.
28. I am careful not to trash nature.
29. I am an advocate for nature.
30. I really want to make a positive impact for nature.
31. I try to reduce the amount of chemicals I use.
32. I try to never use pesticides.
33. I buy local produce when available.
34. I think we really need to support renewable energy like solar and wind.

## **Spirituality**

1. I have had spiritual moving experiences in nature.
2. Nature is a great place to worship.
3. Nature is from the divine.
4. I honor the earth.
5. I have spiritual feelings that are nature-based.
6. I have had spiritual revelations in nature.
7. Knowing nature is of creation makes it more beautiful to me.
8. I focus my spirituality on nature.
9. I see all things in nature as having spirit.
10. Through nature I feel I can communicate with Spirit or God.
11. Nature provides me with a spiritual connection.
12. There are natural areas that I feel are sacred.
13. Nature is a gift from God.
14. My feelings for nature have influenced my religion.
15. I do not believe that God put nature here for us to destroy.
16. I have had amazing mystical in nature.
17. Nature is it; it is the source of all life.
18. Nature provides a way to connect with God or Spirit.
19. I can see the divine in all life.
20. Nature provides a way to connect with all of life.
21. Feeling part of nature is a spiritual experience.
22. Nature is God.
23. Without nature I would feel a spiritual void.
24. Nature helps me to find peace and reach peace and a higher understanding.
25. Communing with nature is a great form of spirituality.

## **Identity**

1. I am more comfortable in nature than in a city.
2. When I'm out in nature, I feel like I can be my true self.
3. It's such a comforting feeling to be out in nature.
4. I would describe myself as earth-connected.
5. I am a nature-lover.
6. My relationship with nature is very important to me.
7. Nature is a big part of me.
8. Nature helps me express myself more freely.
9. Spending time in nature helps to bring out my inner self.
10. Nature is peaceful and calm and that's how I see myself.
11. Nature helps bring out aspects of my personality.
12. My core being is someone who really loves nature.
13. Nature helps form who I am.
14. My feelings for nature influence my interactions with others.
15. I want nature to be a part of my everyday life.
16. I couldn't live somewhere where I had little contact with nature.
17. I feel this call or need to be around nature as much as possible.
18. Nature inspires many aspects of my life.
19. My feelings toward nature have influenced my career choice.
20. Nature helps me find meaning in my life.
21. I am an environmentalist.
22. I feed the birds to bring them into my daily life.
23. I like to experience nature daily.
24. My feelings toward nature form a big part of my identity.
25. My love for nature is a big influence in my life.
26. Most of my hobbies are nature-based.
27. Nature is a huge part of who I am.

## **Fear/alienation**

1. I feel a lack of control when out in nature.
2. I am fearful of many aspects of nature.
3. I do not understand nature that well.
4. I don't want to be out in nature because of the bugs.
5. Nature is dirty and gross.
6. I have trouble relaxing when in the wilderness.
7. Some aspects of nature, like snakes, really freak me out.
8. I have too much fear of nature to go camping.
9. I'm nervous about wildlife.
10. I have had traumatic nature experiences that make me uncomfortable in certain natural areas.
11. I avoid certain areas or aspects of nature.
12. Nature to me is Motel 6.
13. I don't enjoy being out in nature.

14. Nature is just not my cup of tea.
15. I would rather go shopping than spend time in nature.
16. Spending time in nature is boring.
17. I think spending days backpacking in the wilderness would be awful.
18. I do not want any wild animal to come near me.
19. I am afraid of wildlife.
20. Nature is just disgusting.
21. Bugs serve no purpose.
22. I would rather live in the city than in a rural area.
23. I can't imagine living in the country.
24. I am a city person.
25. I would rather play videos or watch TV than be out in nature.
26. I would never enjoy walking in the rain.
27. I don't understand those natural types who spend all their time in nature.
28. People are much more important than animals.
29. I can live without nature just fine.
30. A lot of nature just scares me.
31. Hiking in the woods would make me nervous.
32. If I went hiking, I would be too afraid of all the bugs and snakes to enjoy myself.

## APPENDIX D SURVEY SECTIONS

- Section 1: Mayer & Frantz (2004) Connectedness to Nature Scale;
- Section 2: Sample items that will be developed to form the new scale (therefore these items will change based on interviews);
- Section 3: Schwartz's (1992) self-enhancement and self-transcendent value domains;
- Section 4: Identity measures taken from various studies previously mentioned (Charng et al., 1988; Hitlin, 2003; Stets & Biga, 2003);
- Section 5: A modified ERBI from Smith-Sebasto (1995) (these items may change based on the interviews);
- Section 6: Crowne-Marlowe (1960) short social desirability scale;
- Section 7: Stern's (1999, 2000) VBN including the items used from NEP.

APPENDIX E  
LIST OF SURVEYS WITH SECTIONS

**Survey B:** Survey with behavioral items

Survey Sections:

- Section 2: Sample items that will be developed to form the new scale (therefore these items will change based on interviews);
- Section 6: Crowne-Marlowe (1960) short social desirability scale;
- Section 5: A modified ERBI from Smith-Sebasto (1995) (these items may change based on the interviews);

**Survey V:** Survey with value items

Survey Sections:

- Section 2: Sample items that will be developed to form the new scale (therefore these items will change based on interviews);
- Section 6: Crowne-Marlowe (1960) short social desirability scale;
- Section 3: Schwartz's (1992) self-enhancement and self-transcendent value domains;

**Survey I:** Survey with identity items

Survey Sections:

- Section 2: Sample items that will be developed to form the new scale (therefore these items will change based on interviews);
- Section 6: Crowne-Marlowe (1960) short social desirability scale;
- Section 4: Identity measures taken from various studies previously mentioned (Charng et al., 1988; Hitlin, 2003; Stets & Biga, 2003);

**Survey C:** Survey with CNS items

Survey Sections:

- Section 2: Sample items that will be developed to form the new scale (therefore these items will change based on interviews);
- Section 6: Crowne-Marlowe (1960) short social desirability scale;
- Section 1: Mayer & Frantz (2004) Connectedness to Nature Scale;

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Lisa Pennisi received her bachelor's degree in psychology (with an emphasis in social psychology) from the University of Central Florida in Orlando. She went on to do graduate work in social psychology at Miami University, Ohio. At that time an interest in conservation psychology emerged. Her research interests focused on self and collective efficacy and their role in behavior change. However, she suspended a career in academia to learn about natural resources and environmental science and pursue work in applied settings. Lisa received a Master of Environmental Science degree with an emphasis on public information/mass communication and education from Miami University. Social psychology became a minor. After working in the field as a naturalist, educator and nature center manager, Lisa returned to graduate school to pursue further education in the human dimensions of natural resource management and sustainable tourism.