A CRITIQUE OF THE NEW ECOLOGICAL PARADIGM: STEWARDSHIP AND A CASE STUDY OF THE PACIFIC NORTHWEST LOGGING INDUSTRY

by

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ABSTRACT

A Critique of the New Ecological Paradigm: Stewardship and a Case Study of the Pacific Northwest Logging Industry

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This thesis explores the pro-ecological attitudes of people who work in the logging industry in the Pacific Northwest, specifically in Washington State. A gap in ecological attitude literature was identified – there was no research on the ecological attitudes of people in the logging industry. Because of this lack of research, this was an exploratory study situated within the New Ecological Paradigm (NEP). A survey was developed using the NEP Scale and additional questions about the respondents' work in the logging industry, the respondents' formative experiences in nature, and the respondents' socio-economic and demographic backgrounds (Dunlap, Van Liere, Mertig, & Jones, 2000; Van der Werff, Steg, & Keizer, 2012; Chawla, 1998 & 1999; Kollmuss & Agyeman, 2002; Bell & Braun, 2010). Convenience sampling was used to distribute and gather survey data and 36 surveys were quantitatively analyzed. This research identified stewardship as a key motivation for the strong pro-ecological attitudes of people in the logging industry. Regardless of the apparent, obvious pro-ecological attitudes, the sample population scored below a representative sample of WA residents from 2015 (Steel, Pierce, Warner, and Lovrich). The NEP uses a socially exclusionary lens to measure ecological attitudes leaving little room for stewardship minded individuals.

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Chapter 1: Introduction

This thesis will explore the pro-ecological attitudes, and influencers of those attitudes, of people actively working in the logging industry of the Pacific Northwest (PNW), specifically Washington State. At the time this thesis was written, there were no studies exploring the pro-ecological attitudes of people working in the logging industry. As a stakeholder to the PNW's forests, including the highly contested old-growth forests, these individuals' pro-ecological attitudes are worthy of attention. This thesis will cover how the dominant views within the logging industry have shaped attitudes of working loggers and foresters; how time spent in nature influences ecological attitudes; and the effect of a person's socio-economic-demographic background on their ecological attitude. To measure pro-ecological attitudes, the New Ecological Paradigm Scale was used as it is the most widely used scale of its kind. This research sought to answer the questions:

- What are the ecological attitudes of people actively working in the logging industry in the PNW?
- Is the New Ecological Paradigm Scale a good instrument for measuring the pro-ecological attitudes of people who work in the logging industry?

Background

The logging industry in the Pacific Northwest rose to prominence in the 1880s and throughout its history, technological improvements have meant the loss of available jobs for loggers (Rajala, 1998). In the early days of logging, loggers would work in large teams clear-cutting whole hillsides and with them came families, camps, and suppliers. Undeniably, the logging industry helped to shape the region into what it is today

(Dietrich, 2010; Freudenburg, Wilson, & O'Leary, 1998; Gup, 1990; Loomis, 2015; Rajala, 1998; Roosevelt. 1938) The logging industry brought other industries with it, expanded the railroad infrastructure, introduced steam engine technology, and helped to grow the population (Center for the Study of the Pacific Northwest). As technology advanced though, large teams were no longer needed to fell trees and haul them out of the woods. This trend of technological advancement continued through the years and as mechanization became more prominent logging crews dwindled in size (Rajala, 1998). To illustrate this phenomenon, consider the modern Tigercat tractor manned by one person and capable of felling a tree in mere seconds (2019). Compared to the time and manpower needed to fell a tree in the 1880s, it is no wonder that we have seen a steady decrease in logging jobs over the last 140 years.

Controversy

The old-growth debate started to gain traction in the 1960s and earned a place in public conversation during the 1980s and early 1990s. The debate over old-growth forests, in the simplest terms: loggers wanted to be able to log the valuable timber in old-growth forests to support their jobs and communities, but environmentalists didn't want old-growth forests logger because they wanted to preserve the iconic ecosystems.

On May 23, 1991, all logging operations occurring within national parks' old-growth forests were halted (Seattle Audubon Soc. v. Evans, 771 F. Supp. 1081). Harvesting old-growth timber was suspended because the spotted owl (*Strix occidentalis caurina*) was listed as "threatened" in 1990. Under the Endangered Species Act, the ecosystem occupied by the endangered, or threatened, animal is to be protected and the spotted owl inhabits old-growth forests (Endangered Species Act, 1973). Between 1990

and 2000, logging industry jobs decreased by 30,000 between 1990 and 2000 (Charnley, McLain, & Donoghue, 2008) and the spotted owl quickly became a scapegoat for an entire industry's decrease in jobs. Halting logging in old-growth forests negatively impacted logging communities by ending logging jobs and removing the opportunity for logging jobs on wood that was highly valuable (Charnley, McLain, & Donoghue, 2008; Overdevest & Green, 1995; Ruud & Sprague, 2000).

The issue was so prevalent in public discourse that it even made the cover of Time Magazine in 1990 and images relating to the controversy appeared in other popular sources, as depicted in Figure 1 (Gup, 1990). Figure 1 depicts conflicting perspectives in the spotted owl controversy - the t-shirt advertisement is from the perspective of loggers and the owl comic being more from an environmentalist perspective. The advertisement for t-shirts contains the words "Save a Logger. Eat an Owl." (Logger's World, 1989). Right, a comic from the Seattle Post-Intelligencer showing a spotted owl in its natural habitat holding a sign that says "Don't blame me… I just live here" referencing how the owl is a scapegoat for the logging industry's job decline (1993).

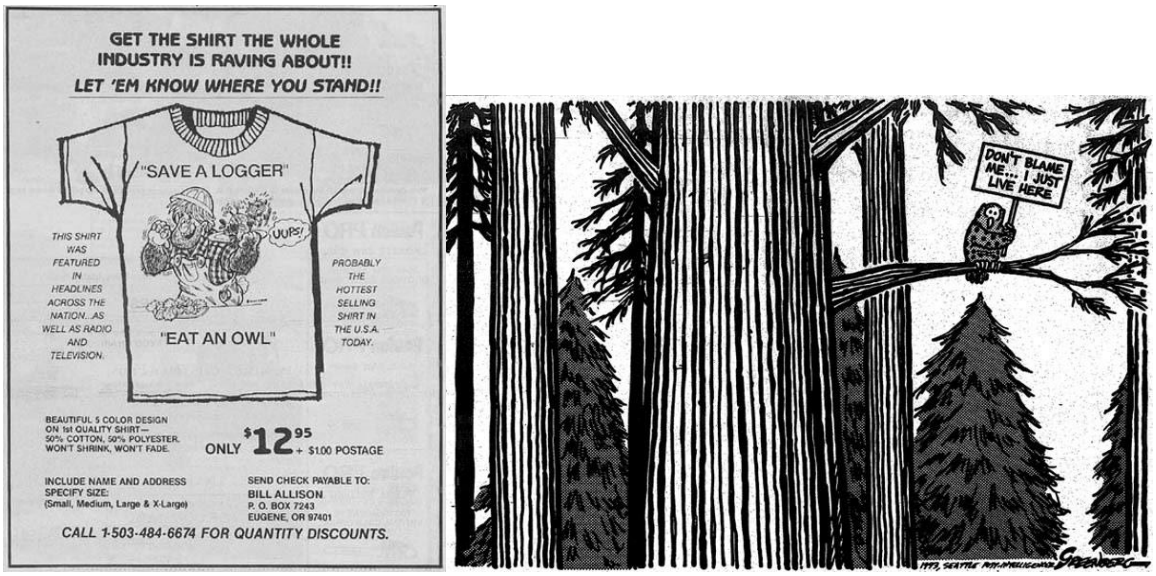

Figure 1. An advertisement to loggers and a comic.

It seems unlikely that a tiny owl is solely responsible for the loss of thousands of jobs. And when logging job loss was investigated more broadly, the owl is arguably not to blame (Freudenburg, Wilson, & O'Leary, 1998).

Framework: Ecological Attitude Predictors and NEP

Research exploring ecological attitudes[1] is one of the largest and most studied area of environmental sociology and even so, there are no studies looking at the ecological attitudes of loggers (Bohr & Dunlap, 2018). Previous ecological attitude research has found that individuals who exhibit pro-ecological attitudes often spend significant time in nature during their youth and have developed a person-place relationship with nature – formative experiences nature (Chawla 1998 & 1999). Chawla argued that formative

[1] *Ecological attitude*. "environmental [ecological] attitude has been conventionally defined as a psychological tendency expressed by evaluating a particular object related to the environment (e.g., environmental protection, nature, or human-environment relationship) with some degree of favor or disfavor" (Zhu & Lu, 2017, 1535).

experiences in nature correlate to a person exhibiting a pro-ecological attitude (1999). Regarding the person-place relationships, researchers found that when a person has a relationship, or strong bond, to a natural place this coincides with having a pro-ecological attitude (Chawla, 1999). Additionally, a person's socio-economic-demographic background influences their ecological attitude as well (Van der Werff, Steg, & Keizer, 2012; Chawla, 1998 & 1999; Kollmuss & Agyeman, 2002; Bell & Braun, 2010). In general, individuals who have obtained a higher educational level, higher economic status, and are politically left leaning tend to have a more pro-ecological attitude (Bohr & Dunlap, 2018; Chawla, 1998 &1999; Laidley, 2013; Fortmann & Kusel, 1990). These findings were considered when developing the questions included on the survey that were paired with the tool measuring pro-ecological attitudes.

This thesis uses the New Ecological Paradigm (NEP) Scale to measure respondents' pro-ecological attitude. This scale has been found to be internally consistent meaning that it represents the attitude it seeks to measure (Dunlap, Van Liere, Mertig, & Jones, 2000; Dunlap, 2010; Hawcroft & Milfont, 2010). Additionally, the NEP Scale was chosen because it is the most widely used (Dunlap, Van Liere, Mertig, & Jones, 2000; Zhu & Lu, 2017). As one of the most widely used scales, this research will likely be comparable to other ecological attitude research (Hawcroft & Milfont, 2010).

Overview of Your Experimental Design and Methods

Surveys were used to gather primary data for statistical analysis using summary statistics. The target population for this research is people who are actively working in the logging industry of the Pacific Northwest and who spend the majority of their working time in nature whether that is performing tasks such as felling trees, building and

maintaining roads, or surveying job sites. The main criteria for a respondent are that their position in the logging industry allows them to work in forests. The sample population was drawn from Washington Contract Loggers Association, Inc. (WCLA) list of certified Master Loggers in the state. The president of the WCLA also facilitated the introductions to Master Logger and the companies they work with. After making contact with participating companies, the surveys were delivered in clusters to logging company employees. In this way, companies were treated cluster samples. Included with the surveys were pre-addressed and pre-stamped envelopes to facilitate returning the surveys. The surveys were analyzed using summary statistics to look for patterns. The job-related questions, formative experiences in nature questions, and socio-economic-demographic questions served as independent variables. The dependent variable was a respondent's ecological attitude determined by their NEP score.

Significance of Research

This research was conducted because there was a gap noticed in the literature of research of ecological attitudes. Broadly, there is no ecological attitudinal research for this population and more specifically no research from the lens of the New Ecological Paradigm (NEP). The lens is exclusionary because even if an individual has a pro-ecological attitude, they can still score poorly on the NEP Scale because of the NEP's narrow lens. Scholarship surrounding ecological attitudes needs to be more inclusionary to develop a better paradigm with which to measure ecological attitudes. This research also offers a critique to the facets tested using the NEP Scale as the facets are exclusionary of people with a stewardship mindset. The NEP scale is not effective for measuring ecological attitudes of populations that don't present the same ideologies for

pro-ecological attitudes that do not match that of the authors. This research offers a critique of the lens that the NEP uses to examine and measure ecological attitudes. People who work in the logging industry possess a working knowledge of how our forests function and have invaluable information for people who are trying to protect the forests. And, to dismiss the logging industry as not ecologically minded based on a narrow paradigm measurement does not allow for the best practices for forest health.

Chapter 2: Literature Review

The PNW is made up of complex ecosystems, none more visible than the old-growth forests and the temperate rainforest. For the people that live in the PNW, forests, mountains, and waterways are inextricably linked to their lives with our societal and cultural practices deeply ingrained in nature. Because of this relationship, many people living in the PNW work in jobs related to ecosystem services[2]. Chapin describes a social-ecological system as having "interdependent physical, biological, and social components [that emphasize] the 'humans-in-nature' perspective" (2009, p. 351). In the context of the forest of the PNW, humans and nature are intricately intertwined and interdependent, representing a unique and special social-ecological system. The environmental attitudes held towards the forests broadly drive the independent relationship between forests and the surrounding human communities creating conditions for a robust logging community. For loggers[3] whose livelihoods depend on the ecosystem services of the forests, the interaction with forest ecosystems is important economically, socially, and ecologically. Through their working knowledge of forests and their lived experiences in nature, logging industry workers understand the importance of this interdependent relationship with forest systems.

[2] *Ecosystems services.* "Benefits that people receive from ecosystem, including supporting, provisioning, regulating, and cultural services" (Chapin, 2009, p. 345).

[3] *Logger.* A person who works for a contract logging company.

Roadmap of Literature Review

This study is situated in the theoretical framework of the New Ecological Paradigm. The paradigm and its scale are explored in this literature review along with a brief history of the PNW logging industry. Additionally, the old-growth spotted owl dispute is addressed as it contextually affects the attitudes of those who work in the logging industry.

The beginning of the literature review covers the theoretical framework this thesis is situated in – New Ecological Paradigm. The paradigm was first proposed by Dunlap and Van Liere in 1978; initially termed "New Environmental Paradigm." A revision was published in 2000 in which they changed the name to "New Ecological Paradigm" (NEP). To measure an individual's acceptance of the NEP, they also created a scale designed to measure a respondent's attitudes towards the environment. Because attitudes are a latent construct, the survey *seeks* to measure attitudes by addressing issues that relate to the environment. A latent construct cannot be directly measured because it is latent, meaning that it is a state of being that a person experiences and acts upon but cannot be directly measured. This study uses the NEP scale that was published in 2000 and addresses the five facets: limits to growth, anti-anthropocentrism (our world is not centered around humans), fragile balance of nature, rejection of exemptionalism, and the possibility of an eco-crisis. Dunlap and Van Liere noticed a national trend within the general public, academics, politicians, and companies of people becoming more ecologically conscientious (1978). In an effort to explain this trend, Dunlap and Van Liere created a scale to measure ecological attitudes and published their findings along with their description of the new paradigm. This paradigm is being used because it was

originally tested in Washington State and the NEP Scale is the most widely used ecological attitude scale.

Next, common ecological attitude predictors are explored to the effectiveness in a variety of populations. The most common predictors are formative experiences in nature, relation to nature, and socioeconomic and demographic backgrounds. Formative experiences in nature address the time a person spends in nature during youth and how that shapes their attitude towards nature. Relation to nature encompasses person-place relationships that may develop to nature and how the time a person spends in nature affects their attitude. Socioeconomic and demographic backgrounds are addressed in sphere of relation to nature and formative experiences in nature impact the formation of attitudes towards the environment. These factors were used in data collection and analysis of pro-ecological attitudes of people in the logging industry.

The history of PNW logging and the paradigm shifts that helped to shape the industry are explored next. A paradigm is a way of measuring time as it pertains to societies and groups of people, how they interact with landscapes, and their perceptions of the world. One such paradigm that this review looks at is the mechanization of the logging industry. It is argued here that as the logging industry veered towards using machines more than manpower, a paradigm shift was experienced (Rajala, 1998; Freudenburg, Wilson, & O'Leary, 1998). The mechanization of the logging industry changed the way the logging industry operates in that advancements in industry mechanization have made the industry less reliant on physical labor. For example, Tigercats—a common logging machine used today—are operated by one person and can fell a tree in seconds. Logging operations today sharply contrast the early days of logging

when it took large crews of men to do work that now takes only a few men to do. To expand on how the logging industry has progressed throughout history, this literature review will provide a historical timeline of actions by organizations and unions. Included is the visit of President Roosevelt to Washington State and his writings about needing national parks following his visit. Another item addressed was the industry's shift towards a focus on sustainability through sustainable yields and replanting areas after they have been logged. Effects of paradigm shifts within the industry are still being felt. For example, "some loggers oppose extensive clearcutting because they feel it threatens the sustainability of their livelihood" (Fortmann & Kusel, 1990, 223).

Then, the context of the logging industry, and population, in the Pacific Northwest is explored. This section addresses and analyzes the dispute over logging old-growth trees and the protection of habitat for the endangered spotted owl. This dispute is rooted in the logging industry's job losses and the steady decrease of logging jobs over the last 80 years (Rajala, 1998; Freudenburg, Wilson, & O'Leary, 1998). Even though the spotted owl's endangered status has been blamed for the job decline, however, the logging industry's own advancements are a more likely candidate for the job losses because of mechanization. Additionally, following the passage of the Wilderness Act and the classification of the spotted owl as endangered, job losses in the industry slowed and the industry's jobs have remained relatively steady since the early 1990s. Understanding the context helps to understand loggers' positionality on forests and nature likely affecting their ecological attitudes.

Explanation of Research Gaps

Within the field of environmental sociology, a lack of research on the attitudes of actively working loggers. There are studies that address various populations' attitudes towards forest land, but not on actual loggers and none that seek to measure the ecological attitudes of loggers (Keefer, Finley, Luloff, & McDill, 2002). There has been some research on ecological attitudes of other extractive industries, just not this particular population. One of the primary goals in this research is to provide a clearer understanding of the under-addressed ecological attitudes of loggers. By addressing this gap, ecological attitude research will be more inclusive of varying types of populations (it appears that your argument is that this population may present an important perspective to inform resource management and environmental protection effots in the Pacific Northwest).

Actively working loggers can be seen as having a tempestuous social history within the PNW. Logging operations have a deep history within the PNW, albeit one of discourse and disdain. Logging operations inherently carry discourse surrounding conflicts of interests regarding land use. This discourse is not unique to logging but mirrors the larger discourse around extractive industries.

This study population of loggers is interesting because they are the ones extracting the trees vs not extracting the trees. Interestingly, there is some academic research and understanding of foresters (Ewert & Baker, 2001). In this context, the term 'foresters' includes people that work in the forests who are not the ones removing trees as well as those that have an advanced degree in forest resources and forest resource management. Loggers are separate from foresters as they are the ones who are actively cutting down and removing trees from the forests—extracting the trees. Because the

ecological attitudes of loggers are unknown, it will be interesting to see what, if any, distinction there is between loggers and foresters. This is because foresters tend to have a pro-ecological view of the environment and nature (Ewert & Baker, 2001). There is no comparison available for loggers' attitudes vs. foresters due to how little research has been documented regarding ecological attitudes of people who work in the logging industry.

There are plenty of assumptions regarding loggers' attitudes by the environmentalist community and others, but these assumptions are not supported by empirical evidence. I would now like to present anecdotal evidence of people who work in the logging industry. Growing up around loggers and foresters, I've listened and observed the pro-ecological attitudes this group. They are fierce advocates for responsible stewardship of nature and loyal to the belief in protection of waterways and species diversity. They spend their careers working to ensure the continuance of forests for future generations whether that be resource use or recreation. In many ways, the argument between the logging community and environmentalists surrounding how to care for our forests mirrors that of argument within the environmentalist community between conservationists and preservationists.

Theoretical Framework: New Ecological Paradigm (NEP)

The New Ecological Paradigm[4] theory serves as the theoretical framework for this research because it helps to address the question of understanding ecological attitudes[5]. To better understand the theory, it is important to first address the concept of ecological attitudes as a latent construct.

Ecological attitudes.

Ecological attitude is a latent construct. A latent construct is something that cannot be directly observed, but rather a deeply held value and belief system of an individual. This also means that a latent construct cannot also be directly measured. For this thesis, ecological attitude is understood through the following definition proposed by Zhu and Lu: "a psychological tendency expressed by evaluating a particular object related to the environment (e.g., environmental protection, nature, or human-environment relationship) with some degree of favor or disfavor" (2017, 79).

There is an inherent challenge, then, to measuring ecological attitudes because they are a latent construct or a deeply held personal value or belief. Ecological attitudes can be measured through a proxy of deliberate questions via surveys and interviews. Those questions are representative of issues related to the environment. In order to

[4] *New ecological paradigm*. Societies are dependent upon ecosystems (Dunlap & Brulle, 2015, 16).

[5] *Ecological attitudes*. "Proecological orientation or 'seeing the world ecologically,' reflected a high score on the NEP Scale, should lead to proenvironmental beliefs and attitudes on a wide range of issues" (Dunlap, Van Liere, Mertig, & Jones, 2000, 428).

quantify and analyze the ecological attitude of an individual, an approximate value is associated with each response so that researchers are able to "measure" a respondent's attitude. A proxy known as the New Ecological Paradigm (NEP) Scale was used for this research.

The New Ecological Paradigm.

The New Ecological Paradigm seeks to explain the growing trend towards pro-ecological attitudes as they became popularized in the 1960s and 1970s. The New Ecological Paradigm directly contradicts the Dominant Social Paradigm (Atav, Altunoğlu, & Sönmez 2015; Dunlap & Van Liere 1978). In the Dominant Social Paradigm, humans are dominant over nature and can extract resources as much as they want and feel are needed. The New Ecological Paradigm shifted to more of a co-existence between humans and nature (Atav, Altunoğlu, & Sönmez 2015).

During that time, a large number of policies, laws, bills, and acts were passed to protect the environment, natural world, and the health of humans relating to the environment. Examples include the Wilderness Act, the Clean Water Act and the Endangered Species Act (see table below for a full list). While most of these were in response to disasters and the visible effects of pollution, they could not have been possible without the public support of activists, the general population, and politicians. Consider the following list of political pro-ecological acts focused on environmental protection or management and the year it was originally passed:

- 1963, Clean Air Act
- 1964, Wilderness Act
- 1966, National Historic Preservation Act

- 1968, Wild and Scenic Rivers Act
- 1970, National Environmental Policy Act
- 1972, Clean Water Act
- 1972, Coastal Zone Management Act
- 1972, Marine Mammal Protection Act
- 1972, Marine Protection, Research, and Sanctuaries Act
- 1972, Noise Pollution and Abatement Act
- 1973, Endangered Species Act
- 1974, Safe Drinking Water Act
- 1976, Federal Land Policy and Management Act
- 1976, Magnuson–Stevens Fishery Conservation and Management Act
- 1976, National Forest Management Act
- 1976, Resource Conservation and Recovery Act
- 1976, Toxic Substances Control Act
- 1977, Surface Mining Control and Reclamation Act

In addition to the plethora of policies, acts, bills, and laws passed during this time, President Nixon also established the Environmental Protection Agency (EPA) in 1970, which was unique considering the administration's conservative agenda. The establishment of the EPA, whose mission is “to protect human health and the environment” helps to represent the bipartisan desire to protect the environment and the health of those that interact with nature (US EPA, 2013). The federal policies, acts and laws passed throughout the sixties and seventies, in conjunction with the establishment of the EPA, represent a nationwide paradigm shift towards a more pro-ecological attitude.

There are several examples at the state level that exemplify the pro-ecological attitude trend as well, including the Washington Environmental Policy Act of 1971.

The policies, acts, and statutes referenced above are a political representation of the New Ecological Paradigm that Dunlap and Van Liere set out to explain (1978). As the paradigm became more popular, there was a stark shift away from the current Dominant Social Paradigm (DSP), which describes humans as the dominant species that can or must, exhibit control over nature (Dunlap & Van Liere, 1978; Dunlap & Van Liere, 1984). Dunlap and Van Liere described it as "our nation's DSP was formed during a bygone era of extraordinary abundance, and thus much of it (e.g., commitments to laissez faire, individualism, progress, and growth) is no longer adaptive in an era of ecological limits" (1984, 1014).

Additionally, there is a centrality of the human species within the DSP as well as a lack of consequences for the actions of humans (Dunlap & Van Liere, 1978; Dunlap & Van Liere, 1984). This means that within the DSP, humans are at the center of the natural world. In response to the tenants of the DSP, the NEP places the consequence of an action foremost, suggesting that humans are no longer exempt from their actions (Dunlap & Van Liere, 1978).

Table 1. Quoted definitions of NEP facets (Atav, Altunoğlu, & Sönmez, 2015, p. 1394).

Facet	What the response to the variable indicates
Limit of growth	"The New Ecological Paradigm suggests that growth and development have a limit, which is based on the limitedness of the resources in the world. In line with this view, the item 1 puts an emphasis on population increase, and item 11 highlights the limitedness of resources via an analogy likening the world to a spaceship. In item 6 which is based on this theoretical background, stands as a negative item suggesting that the world has plenty of resources."

Anti-anthropocentrism	"It is the theoretical [facet] involving the view that nature exists for meeting the needs of human beings in the first place (items 2 and 12) as well as the view rejecting it (item 7)."
Fragility of nature	"NEP claimes the existence of a balance that can be disrupted by human beings. The items 3, 13, and 8 of the scale are about the theoretical [facet] of balance of nature."
Rejection of exemptionalism	"It is one of the theoretical [facet] covering the items 9, 4, and 14 of the New Ecological Paradigm Scale. It is based on the idea that the people who accept the New Ecological Paradigm are supposed to reject that human beings is exempt from nature and the laws of nature."
Ecocrisis possibility	"NEP argues that human intervention in nature may lead to negative results at a disaster level that might be described as an eco-crisis. The items 5,10, and 15 of the scale are about the theoretical background of eco-crisis."

Dunlap and Van Liere best sum up the New Environmental Paradigm with the description: "we increasingly hear of the inevitability of 'limits to growth,' the necessity of achieving a 'steady-state' economy, the importance of preserving the 'balance of nature,' and the need to reject the anthropocentric notion that nature exists solely for the human use" (1978, p. 19). 'Limits to growth' here means that unyielded growth is not sustainable as the increased needs for resources will inevitably use up all available resources. 'Steady-state economy' used in this description speaks to the need for capping economic growth for the purpose of sustaining our resources. In their sense of 'balance of nature,' the authors emphasize the necessity of living in equilibrium with nature, and how fragile this balancing act can become. Therefore, humans need to lessen the quantity at which they alter nature because of the possible consequences of such actions. Anthropocentric means that nature solely exists for human use, but the New Environmental Paradigm rejects this notion. To 'reject the notion of anthropocentricity,'

means to reject regarding natural resources as commodities (Atav, Altunoğlu, & Sönmez in 2015). See Table 1 for the entire defintions by Atav, Altunoğlu, and Sönmez used for this thesis (2015).

NEP Scale

The scale that the NEP uses to quantify a person's ecological attitude was first published in 1978 under the title New Environmental Paradigm Scale (Dunlap & Van Liere, 1978). Then, in 2000, the authors published a revised scale named the New Ecological Paradigm Scale (Dunlap, Van Liere, Mertig, & Jones, 2000). This section addresses the scale itself and the evolution of the scale from the original, 1978 version to the revised, 2000 version. These versions are both described for the purpose of better understanding the applicability and effectiveness of this instrument. First the terminology used for this instrument is discussed. Next, the original, 1978 version is discussed followed by the revised, 2000 scale specifically addressing the authors' revisions to the original, 1978 scale.

Terminology for the NEP Scale

The scale is the instrument, or tool, being used to quantify a respondent's pro-ecological attitude. This instrument uses a likert scale for indicating the level of agreement and each level has a numerical value associated with it. For example, in this study, the level of agreement Strongly Disagree has a value of 1 and the level Strongly Agree has a value of 7. Items are comprised of the statement and the level of agreement likert scale option that the respondent selects. A statement is the sentence that a person is indicating their level of agreement with. For example, the first statement of the revised,

2000 NEP scale is “we are approaching the limit of the number of people the earth can support.”

The statements combined with the option for level of agreement that the respondent indicates creates an item which is then scored creating the scale that is used.

The original, 1978 scale.

The original scale consisted of 12 items – 8 pro- and 4 anti- environmental statements (Dunlap & Van Liere, 1978). The authors suggested using a 5-point likert scale with the likert responses being reverse coded for the anti-environmental statements. The likert scale response is statistically analyzed by assigning a value to each statement. Reverse-coding means assigning the highest numerical score to the disagreement option. The authors built in the need for reverse coding in an effort to make sure respondents were reading the statements before responding opposed to just selecting the same option for every item. Quantitatively, then, a higher score indicates a more pro-environmental attitude and a lower score indicating a less pro-environmental attitude (Dunlap & Van Lierre, 1978). Table 2 is the original, 1978 scale and its statements.

Table 2. New Environmental Paradigm Scale, Original from 1978 (Dunlap & Van Lierre).

1. We are approaching the limit of the number of people the earth can support.
2. The balance of nature is very delicate and easily upset.
3. Humans have the right to modify the natural environment to suit their needs.
4. Mankind was created to rule over the rest of nature.
5. When humans interfere with nature it often produces disastrous consequences.
6. Plants and animals exist primarily to be used by humans.
7. To maintain a healthy economy we will have to develop a “steady-state” economy where industrial growth is controlled.
8. Humans must live in harmony with nature in order to survive.
9. The earth is like a spaceship with only limited room and resources.
10. Humans need not adapt to the natural environmental because they can remake it to suit their needs.
11. There are limits to growth beyond which our industrialized society cannot expand.

12. Mankind is severely abusing the environment.

The statements all fit within one of three facets: balance of nature, limits to growth, and human dominance over nature (Hawcroft & Milfont, 2010). The facets within the scale represent the different core facets of the paradigm. Additionally, there is a benefit to being able to separate the statements allowed researchers to categorize responses for further analysis. The standardized paradigm, scale, and facets gave researchers the ability to further analyze the environmental attitudes across studies (Hawcroft & Milfont, 2010; Dunlap, Van Lierre, Mertig, & Jones, 2000).

Over the years, the New Environmental Paradigm Scale became the most widely used means of measuring individuals' environmental attitudes (Hawcroft & Milfont, 2010; Dunlap, Van Lierre, Mertig, & Jones, 2000). Other social scientists developed similar scales, including the analytical group Gallup, even though the scale developed by Dunlap and Van Lierre remained as the most widely used (Hawcroft & Milfont, 2010; Environment, Gallup Historical Trends).

The Revised, 2000 Scale.

The original, 1978 scale went through a series of revisions until the current version was published in 2000 (Dunlap, 2010; Hawcroft & Milfont, 2010; Dunlap, Van Lierre, Mertig, & Jones, 2000). Notable revisions to the scale are the terminology, language, and the addition of more statements to even out the disproportion between the pro- and anti-environmental attitude statements (Dunlap, 2010; Hawcroft & Milfont, 2010; Dunlap, Van Liere, Mertig, & Jones, 2000). Where the original scale used language like 'mankind,' the revised scale uses 'humans' instead. Additionally, the name of the scale changed from New Environmental Paradigm to New *Ecological* Paradigm (NEP) in

large part because of the politicized connotations of the word environmental (Dunlap, Van Liere, Mertig, & Jones, 2000). Dunlap and colleagues added additional anti-environmental statements – now there were 8 pro- and 7 anti- environmental statements (Dunlap, 2010; Hawcroft & Milfont, 2010; Dunlap, Van Liere, Mertig, & Jones, 2000). These revisions were done to make the scale a more reliable instrument (see Table 3 for the revised, current scale). Table 3 contains the statement, whether or not the statement is written in the pro- or anti- way and what facet the statement fits within.

Table 3. New Ecological Paradigm Scale, published in 2000 (Dunlap, Van Liere, Mertig, & Jones, 2000; Hawcroft & Milfont, 2010).

Statement	*Determinant*	*Facet*
1. We are approaching the limit of the number of people the earth can support.	Pro-environmental	Limits to Growth
2. Humans have the right to modify the natural environment to suit their needs.	Anti-environmental	Anti-anthropocentrism
3. When humans interfere with nature it often produces disastrous consequences.	Pro-environmental	Balance of Nature is Fragile
4. Human ingenuity will ensure that we do NOT make the earth unlivable.	Anti-environmental	Reject of Exemptionalism
5. Humans are severely abusing the environment.	Pro-environmental	Possibility of Eco-crisis
6. The earth has plenty of natural resources if we just learn how to develop them.	Anti-environmental	Limits to Growth
7. Plants and animals have as much right as humans to exist.	Pro-environmental	Anti-anthropocentrism
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	Anti-environmental	Balance of Nature is Fragile

9. Despite our special abilities humans are still subject to the laws of nature.	Pro-environmental	Reject of Exemptionalism
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated.	Anti-environmental	Possibility of Eco-crisis
11. The earth is like a spaceship with very limited room and resources.	Pro-environmental	Limits to Growth
12. Humans were meant to rule over the rest of nature.	Anti-environmental	Anti-anthropocentrism
13. The balance of nature is very delicate and easily upset.	Pro-environmental	Balance of Nature is Fragile
14. Humans will eventually learn enough about how nature works to be able to control it.	Anti-environmental	Reject of Exemptionalism
15. If things continue on their present course, we will soon experience a major ecological catastrophe.	Pro-environmental	Possibility of Eco-crisis

The scale has been found internally consistent repeatedly (Dunlap, 2010; Hawcroft & Milfont, 2010; Dunlap, Van Liere, Mertig, & Jones, 2000). In 2010, Hawcroft and Milfont published an extensive meta-analysis review of the NEP scale. Their findings were consistent with Dunlap and colleagues concluding the scale is internally consistent meaning the scale measures what it intends to measure. Hawcroft and Milfont found the scale to have a Cronbach's alpha score of 0.83 (2010) and in a review of the scale published by Dunlap in 2010, he also produced an alpha score of 0.83. This Cronbach's alpha score statistically supports that the NEP is internally consistent. A Cronbach's alpha score does not, however, imply unidimensionality meaning that the scale could be measuring more than just a respondent's pro-ecological attitude.

Additional Limitations of the NEP Scale.

One of the major weaknesses of the NEP scale is primarily that even though the scale does seem to be measuring what it intends to measure, it is not unidimensional. Items could be measuring a respondents' attitude as it relates to another value they may hold and believe in. For example, several items address humans' roles in the world as not the dominant species, but rather more equal with plants and other animals. These items are attempting to see what value the respondent places on nature by measuring whether the respondent sees nature as their equal. This is a problematic measurement because a person can have a pro-ecological attitude and see humans as a dominant species that should be accountable for our actions. Arguably, holding humans accountable because of our superiority is more meaningful and applicable within the larger discussions of how humans should interact with nature. For example, in conversations surrounding climate change mitigations and actions, the acknowledgement of our species' destruction and devastation to our environment is crucial before we can employ new, more pro-environmental infrastructure. Holding ourselves accountable to the destruction we've caused by thinking ourselves superior is necessary to not repeating those actions. As proposed by the NEP, we would think ourselves equal implying a lack of accountability for those actions and future destruction caused by or species' superiority.

Culture Theory as a Relational Theory

Another theory to consider when looking at the logging industry is Culture Theory[6]. Culture can greatly influence a person's life from the career they choose to the

[6] The definition of *Culture Theory* used in this thesis is a drawn from the definition of *Consumer Culture Theory*, "interrelations are manifested across a wide range of consumption contexts and brings to light core commonalities, revealing points of distinction" (Anould & Thompson, 2018, p. 12). The reason that *Consumer Culture Theory* was used primarily as the definition of *Culture Theory* for this thesis is because

food they eat (Anould & Thompson, 2018) and people within the logging industry are no exception. Research has also been conducted to examine how culture influences a person's opinions towards environmental issues (Feinberg & Willer, 2013; Price, Walker, & Boschetti, 2013). In particular Feinberg and Willer found that when environmental issues are framed to align with a person's culture, that person reports an increase of support to the issue presented (2013). Culture theory is useful when thinking about the logging industry because the culture dominates the opinions of those who work in it.

Ecological Attitude Predictors

In investigating pro-ecological attitudes, it is helpful to understand general motivations and influencers that drive a person's pro-ecological attitude. Why do people act pro-ecologically and what influences an individual's ecological attitude? In considering what causes a person to act pro-ecologically, there are similarities in the literature of person-place relationships, place-of-origin[7], and time spent in nature that can lead to a person self-identifying as an environmentalist later in life (Van der Werff, Steg,

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how a population consumes products can largely define and because the logging industry is an industry in which a resource is extracted and products are created and used for consumption.

[7] *Place-of-origin*. Place-of-origin in this thesis refers to where a person spent the early part of their life and their youth (Chawla, 1998 & 1999). For example, a person who grows up in Olympia would have a place-of-origin of Olympia. Many studies look at what events from childhood and youth influenced pro-environmental attitudes and behaviors identifying time spent in nature and person-place relationships as primary similarities between self-identified environmentalists who exhibit pro-environmental attitudes and behaviors. The gap in the literature is around whether or not a person's place-of-origin is related to pro-environmental attitudes and behaviors.

& Keizer, 2012; Chawla, 1998 & 1999; Kollmuss & Agyeman, 2002; Bell & Braun, 2010). In other words, a person with a pro-ecological attitude likely had formative experiences in nature and continue to experience some relation to nature. In addition, the literature suggests that a person with a pro-ecological attitude is more likely to be white, young, have a higher education, and wealthy to some extent. This research uses this information to build parts of the survey used to gather data.

This thesis incorporates the aspects of a person-place relationship, place of origin and time spent in nature to evaluate ecological attitudes of loggers through a three-sectioned survey. The first section is an examination of person-place relationships. Person-place relationships are especially strong towards the home and can influence non-environmentalists to take action when seeing their home affected by climate change in the form of floods, wildfires, and severe droughts. This is followed by a section concerned with a person's place of origin. There is little research around place-of-origin, but because the home is valued among environmentalists and non-environmentalists alike, place-of-origin is included. The next section is about time spent in nature and formative experiences in nature. This section is also centered around childhood as the research supports the importance and influence of time spent in nature as a child.

Person-place relationships.

Observing the world around us helps to form relationships with places. Bonds and relationships to places are called person-place relationships (Chawla, 1999). Person-place relationships are the attachment that people form to places that hold sentimental value to them (Chawla, 1999). This idea is recurring in the literature and is the bond formed between people and places, whether it be a tree climbed when one was younger, a

favorite hiking place, or a place where a significant memory was made (Chawla, 1999). This bond tends to form during childhood, but may not exclusively be formed then. Chawla found that significant events involving nature, which could be anything from the cherished memory of a camping trip to the destruction of a favorite natural spot, are also key to forming a person-place relationship that influences pro-ecological attitudes (1999). These bonds are important to recognize because the bonds can then influence how a person reacts to observing environmental distress. Although there are sharp differences between cherished memories and the destruction of a favorite place, the importance is the relationship a person formed with that place (Chawla, 1999). This is because the relationship is an important factor. Additionally, person-place relationships are often formed with environments that people grow up in opposed to forming a relationship with an environment a person may never have visited.

One of the most common places that individuals form connections with is the 'home.' When a person's home, or where they grow up, is being negatively affected by environmental distress, human-caused or otherwise, this can spark a change in their ecological attitude (Chawla, 1998 & 1999; O'Shaughnessy & Kennedy, 2010). Due to sentimental ties people form with places, people are more likely to take up action when those specific places are threatened. For example, climate change impacts may negatively affect one's favorite place, causing them to seek out pro-ecological solutions. And, they may even act on those possible solutions. This has also been the case for people that do not identify as environmentalists (Bell & Braun, 2010). When homes are threatened by negative impacts on the natural environment, many people respond by developing a stronger resolve towards protecting the environment (Chawla, 1998 & 1999;

O'Shaughnessy & Kennedy, 2010). People's ecological attitudes can become more pro-ecological because of strong person-place relationships and a common catalyst is seeing the effects of ecological damage on a cherished place. Seeing the home impacted by human caused environmental stressors can be influential for many people's pro-ecological attitude.

Sometimes spending time away from the home and returning later to find the home altered by anthropogenic forces can spark a new resolve to act pro-ecologically. In the case of central Appalachian coal mines of West Virginia, it took some people leaving their homes, and place-of-origin, to see what negative environmental impacts were taking place in their hometown (Bell & Braun, 2010). Bell and Braun found that of the eight male activists interviewed, six of them spent five to thirty years living outside of the coalfield region (Bell & Braun, 2010). Those six activists cited their time living away from the coalfields and returning as a motivator to change their environmental attitude (Bell & Braun, 2010). They commented that upon return, they could see the damage being done to their home environment by the coal business (Bell & Braun, 2010). This study represents the idea that living in one's place-of-origin, and home, can blind oneself to the negative environmental impacts taking place. In the case of the coalfields in West Virginia, the respondents could see the damage being done to their home upon returning and decided to become environmentalists (Bell & Braun, 2010). Bell and Bruan's study influenced the research for this thesis because it examined an extractive industry, suggesting that time spent away from an area experiencing anthropogenic forcing allows someone to visualize the impacts humans are having on that environment.

Bell and Bruan's 2010 study was incorporated to formulate a question on the survey used for this research. Specifically, the question asked participants where they grew up and where they live now, with the interpretations of those results suggesting the timeframe they've spent experiencing the same the region. Interestingly, loggers, on average, tend to live and work in the same area that they grew up in (Satterfield, 2004). This could mean that they have not spent time away from where they grew up and could, therefore, not have anything to compare their home environment to.

Place-of-Origin and Relations to Nature

Within the studies of ecological attitudes, there is research on the importance of spending time in nature as a child. Time spent in nature can encompass a wide range of activities children do outdoors, from throwing a frisbee on a summer day to taking a class trip to hike at a local park. Additionally, place-of-origin is connected to how much time a child spends in nature (Chawla, 1998 & 1999). For example, in considering activities in nature that children engage with, those activities can be largely dependent on where a child is raised. To illustrate how access to natural areas may be different depending on a child's residence, a child who is raised in a rural area will have easier access to natural elements such as grass, trees, and possibly wilderness. Whereas a child who is raised in an urban, inner-city environment will likely have less access to natural areas. For loggers, many grew up in the woods they now work in and are familiar with the nature that surrounds their lives (Satterfield, 2004; Rajala, 1998).

A notable study in understanding the influencers of pro-ecological attitudes was done by Chawla in 1999. In this study, fifty-six environmentalists in Norway and Kentucky were surveyed and interviewed (ibid). These two locations were chosen

because the respondents would have grown up in vastly different societies and environments. The respondents were asked questions about their childhoods, where they grew up, their learning institutions, and their adult lives (ibid). The responses were compared by close examination to look for similarities. The most common response was spending time in nature and a formative experience with, or around, nature – both happened during childhood (ibid). Time spent in nature and formative experiences fostered a later affinity for these individuals' pro-ecological attitudes. Chawla's study has been cited repeatedly in the literature as a foundational study in trying to understand motivations for pro-ecological attitudes (Latif et al., 2013; Kollmuss & Ageyman, 2002).

Memories of time spent in nature as a child influence adult ecological attitudes (Chawla, 1998 & 1999). These memories can be more about an experience in nature, like camping with family in the summer, rather than exclusively about the length of time spent in nature. Chawla's research, along with others, looked specifically at how memories impact a person's ecological attitude (Lohr, 2004). Chawla's research found that those with strong memories associated with nature tended to have a more pro-ecological attitude; that someone with a strong negative memory or a strong positive memory had a pro-ecological attitude (Chawla, 1999).

Childhood Experiences in Nature

For some people, visiting and spending time in an exotic part of the world changes how they view the environment and increases their pro-ecological attitudes (Latif et al., 2013; Bell & Braun, 2010; Duerden & Witt, 2010). Spending time in exotic locations can lead to more pro-ecological attitudes for two reasons. First, visiting an exotic part of the world that is particularly threatened by anthropogenic forcing is "eye-

opening" for those that live in a place not immediately threatened (Duerden & Witt, 2010). Visiting an exotic place being affected by anthropogenic forcing often has a greater impact on an individual than learning about that place in a classroom setting (Duerden & Witt, 2010). Second, visiting exotic places, and spending time away from one's home, can be "eye-opening" upon one's return to their home (Duerden & Witt, 2010; Bell & Braun, 2010). This is because while away, a person can get accustomed to a different environment and upon returning home they view the area from a new perspective, often seeing the effects of anthropogenic forcing on their home (Bell & Braun, 2010).

There is a study that looked at a youth environmental program where participants visit the Amazon Rainforest and Inca Trail (Duerden & Witt, 2010). The program is broken up into two sections – an in-class section and a section devoted to traveling to the region they were learning about (ibid). This particular study looked at five groups of students that went to the Amazon Rainforest and hiked the Inca Trail to Machu Picchu (ibid). The students surveyed were between the ages of fourteen and fifteen who went through the classroom section of the program in their hometowns in the United States before traveling to South America (ibid). In the course of the youth program, students were surveyed after the classroom section, during their trip, and after their trip. In regard to their traveling experience, students would emphasize their change in pro-ecological attitude (ibid). The student respondents would attribute this change in pro-ecological attitude as a reaction to spending time in the Amazon Rainforest (ibid). This study exemplifies one of the major effects on individuals developing pro-ecological attitudes (ibid). Spending time in nature, especially in an exotic location, can cause people to be

more likely to develop a pro-ecological attitude (Duerden & Witt, 2010; Latif, Omar, Bidin, & Awang, 2013; Bell & Braun, 2010).

In the studies mentioned above, children spent time in nature, and this correlated with an increase in pro-ecological attitude (Duerden & Witt, 2010; Chawla, 1999). There appears to be correlations present between spending time in nature and expressing pro-ecological attitudes as an adult. Because of this correlation, a section was added to the survey asking about time spent in nature during a respondents' youth.

Socio-economic status and demographic background.

Socio-economic status and demographic background have been looked at many times and by a number of different researchers to understand their determinant potential for pro-ecological attitudes. There seems to be consensus among researchers that gender, education, occupation, income, and political leanings are determinants of a person's pro-ecological attitude (Laidley, 2013; Fortmann & Kusel, 1990; Pienaar, Lew, & Wallmo, 2013; Hawcroft & Milfont, 2010). Specifically, exhibiting a pro-ecological attitude is "higher for younger adults, individuals with a higher level of education, political liberals, Democrats, and urban residents, whereas environmental concern is lower for individuals employed in primary industries[8]" (Pienaar, Lew, & Wallmo, 2013, 1535). Hawcroft and Milfont's results also support that individuals who hold blue-collar jobs score significantly lower on the NEP than those with a white-collar job (2010). Additionally, "women, persons with higher levels of education, and those employed in nonfarm occupations have been found to be more likely to have [pro-ecological] attitiudes"

[8] Primary industries are extractive industries or a resource collection type industry, some examples of primary industries are logging, mining, and farming.

(Fortmann & Kusel, 1990[9], 215). Fortmann and Kusel also found that gender had a statistically significant effect on the respondents' opinions. They found that women were more likely to exhibit pro-ecological attitudes than men in their sample.

In another study, Laidley attempted to measure variables that influence pro-ecological behaviors among municipalities in Massachusets. They found that "higher rates of college-educated populations, lower home values, [...] higher proportion of Whites" correlated to pro-ecological behaviors. Their findings support similar ones in the sociological research such that social class and culture do influence a person's behavior, and attitude, towards the environment and nature. Laidley also found that social class positively correlates to exhibiting pro-ecological attitudes (2013). Meaning that as an individual's class status increases so does the pro-ecological attitude.

One study looked at the "well-being" of individuals residing in forest-dependent communities. Forest-dependent community refers to a community that is economically dependent on the economic value of the forest. The researchers found that forest-dependent communities had a significantly higher income per capita than neighboring communities that were not forest-dependent (Overdevest & Green, 1995). This study explored the "well-being" of forest-dependent communities, the authors found that forest-dependent communities had higher income per capita than did neighboring, non-forest dependent, communities (ibid). The authors of that study calculated community economic well-being as being dependent on personal per capita income and community poverty rates – where higher income and lower poverty rates would indicate a higher community

[9] Fortmann and Kusel looked at the effect of residential status on individuals' opinions of forest management practices in a nearby national forest.

economic well-being (ibid). They also found that "employment in logging is positively related to per capita income and increasing employment in agriculture is associated with lower per capita income" (Overdevest & Green, 1995, 124). These findings could offer, at least partially, an economic reason for why people choose a career in logging if they live in forest-dependent communities. Overdevest and Green looked at forest-dependent communities and found that counties with logging tended to have higher income per capita even stating that logging "has a positive, significant estimate" on the "well-being" of the rural community in which loggers live (Overdevest & Green, 1995, 125). However, the study conducted by Laidley found that economic standing does not have a significant impact on exhibiting pro-ecological behaviors (2013) and because attitudes influence behaviors (Duerden & Witt, 2010), economic standing may not have a significant impact on ecological attitudes.

A synthesis paper published in 2013 sought to understand the effects of socio-economic-demographic on an individual's ecological attitude (Laidley). Laidley used data collected by state agencies (Massachusetts Department of Revenue, Massachusetts Secretary of State, and the US Census Bureau) to better understand the effects of a person's status (2013). Statistical analysis methods, such as ordinary least squares multivariate regression and binary logistic regression, were used to understand the data. The author found that education levels and political ideology were better predictors of ecological attitudes than economic status. Increase in education levels and more liberal political ideology correlated to a pro-ecological attitude. Interestingly, some economic metrics correlated to an increase in "green" purchases, such as hybrid automobiles, but not all data represented this (Laidley, 2013).

A primary research study published in 1990 investigated the ecological attitudes of individuals living near national forests (Fortmann & Kusel, 1990). The researchers surveyed residents in communities near Klamath National Forest and Tahoe National Forest. Among the significant factors predicting an individual's ecological attitude, the researchers found that gender, education, and work experience in forestry were statistically significant (ibid). Women were more likely to develop a pro-ecological attitude and those who obtain a higher education level correlated to a pro-ecological attitude (ibid). Lastly, work experience in forestry was significant, but for only one of the researchers' samples.

This research offers a few examples of how socioeconomic and demographic background factors can influence an individuals' pro-ecological attitude. Most broadly, some common influencers of pro-ecological attitudes are people who are white, women, wealthy, and align with liberal political ideals.

History of Paradigm Shifts in PNW Logging

The logging industry has seen many paradigm[10] shifts[11] ranging in effect and the rate that the shift happened. The effects of these shifts are felt throughout the industry. Explored here are two shifts: 1) the mechanization of the industry and 2) the changing worldview. As the technology of logging mechanisms improved over time, employment numbers decreased resulting in smaller crew sizes. As sustainable practices grew in

[10] *Paradigm*. A set of frameworks, worldviews, and systems that a society operates within. (cite source)

[11] *Paradigm shifts*. When a society living within one paradigm shifts towards a new set of ideals, frameworks and values (Dunlap, 2010).

popularity, the industry recognized a growing need to replant trees in order to sustain renewable harvest possibilities of the forests. And, during the 1930s, the logging industry unionized around the idea of sustainable yields.

Background of logging in PNW.

The logging industry in the PNW represents a social-ecological system. The forests represent a valuable ecological resource that supported regional development, and the loggers – who work in the forests – represent the social component of the system who rely on the ecological resource to sustain their livelihood. People living in the PNW have practiced logging as a tool for resource utilization for centuries with commercial logging beginning around 1880 (Rajala, 1998). Throughout the early days of commercial logging, large work crews clear-cut forests to enhance the accessibility of timber resources. Clearcutting is the process of cutting down all of the mature trees in a designated area. Typical work crews consisted of ten to thirty men, each with specialized tasks ranging from tree feller to swamper (a swamper is someone who moves the downed trees and brush) to those that would load logs on crates to be pulled out by a donkey, ox, or horse team. Loggers utilized many of the region's watersheds and would roll logs into a waterway to guide them to the nearest mill for processing. Although technology advanced over the years, the overall logging process stayed the same: falling trees, get them out of the forests, and transferring logs to a local mill for processing and distribution (Rajala, 1998).

During the early 1900s, an increase in technological advancements utilized by the logging industry increased the output of timber resources. One of the most notable advancements for logging in the PNW was the steam donkey. The steam donkey was

considered to be a “yarder” (i.e. a machine that sits in a logging site and pulls logs into the area where they will be picked up for transfer). Use of the steam donkey was popular among logging crews for decades and serves as one of the first major technological advancements used in the industry (Rajala, 1998).

As technology continued to advance and inundate the industry, employment numbers dwindled as machines replaced loggers (Rajala, 1998). The use of aerial photography, for example, was used in the industry to get a “bird’s eye” view of prospective timber sites (Rajala, 1998). By having a picture of the prospective site, loggers could figure out efficient ways to access the new site and were able to determine where they could place equipment to maximize its use. Aerial photography also allowed loggers to track logs that were removed from the new site. With the introduction of new equipment and advancements in engineering practices, the industry saw a need for the creation of a bachelor's degree in logging engineering making a material effect of the mechanization paradigm shift. The bachelor’s degree extended beyond the classroom and suggested that logging was advancing to a point where a technologic-driven crew could outperform a traditional logging crew. Logging companies and their crews who utilized the technological advancements tended to be smaller, yet more productive than traditional crews (Rajala, 1998).

Parallel to the advancement of technology, loggers continued to face issues, which they addressed through strikes and the formation of unions. Poor working conditions and unsanitary logging camps, for example, led to a 1935 logging strike (Loomis, 2015; Rajala, 1998). Loggers resented the unsanitary condition of many logging camps and were frustrated that they were losing jobs to technology. Additionally, the

region suffered a loss of logging opportunities due to unsustainable logging practices, such as clearcutting, which left vast landscapes scarce of a renewable resource. This led to another paradigm shift for the logging industry—the formation of logging unions. The United Brotherhood of Carpenters (UBC) formed in 1935 and established itself as a union that would protect companies' logging rights and practices. In 1937, the International Woodworkers Association (IWA) was formed and established itself apart from the UBC by having different core values and advocating for loggers rather than logging companies. IWA seemed to have fought against corporate and private logging and wanted ecologically sustainable logging, replanting, and protection of forests. The IWA advocated that sustained harvests and replanting were necessary for continued logging in the region (Rajala, 1998). This can be seen in a 1938 statement released by the IWA: 'We shall unite in every honest effort to save the forests. Real conservation, selective logging, sustained yield, reforestation, fire preventions--coupled with union recognition, union wage scales, means sustained prosperity in the lumber industry for all!' (Loomis, 2015, 425).

The IWA believed that the loggers were noticing a disturbing trend in their forests, this being they were not growing back after being clear cut. Until then, it was widely believed that trees would grow back naturally without the assistance of man after a site was clear cut (Rajala, 1998). When President Roosevelt visited the PNW in March of 1938, he saw a landscape that had been exposed to prolonged heavy logging, causing an overall timber depletion. This led the President to declare that the disappearance of forest resources was "a matter of vital national concern" (Roosevelt, 1938). The President was most concerned over the lax reforestation and erosion. Lax reforestation means there

was little effort to replant trees after the timber was felled. He recognized a need to replant clear-cut areas with trees after logging in order to replenish forest growth and to protect the soil. After experiencing the devastation of PNW rainforests from logging, President Roosevelt designated areas of the Olympic Peninsula to serve as a national park. In June 1938, Olympic National Park was officially created (Loomis, 2015). The paradigm shift towards sustainable forestry was supported by President Roosevelt's action. A material impact of this shift incorporated the use of replanting logging sites with saplings to support renewable harvests while maintaining forest and soil health. While there was some backlash to this, in the beginning, the industry eventually accepted replanting as a standard practice (Rajala, 1998).

Second half of the 20th century.

The second half of the 20th century was dominated by the old-growth and spotted owl disputes. Before diving deeper into the major events in this dispute, it is worth highlighting the paradigm shifts that occurred throughout this dispute. One shift concerned the logging industry itself and the other shift concerned the general public. Within the logging industry, there was a shift away from the conservation of species diversity and forest protection. Outside of the industry, people began to dislike the environmental impact logging was having on the region. Many people, for example, resented changes to the aesthetic characteristics of the region and were unhappy with continued threats to iconic species living in the forests. As a result, more and more people began to self-identify as environmentalists who were critical of the logging practices and loggers themselves. As logging industry jobs continued to decrease, loggers started to blame the environmentalists who pushed for more logging regulations and forest

protections (Freudenburg, Wilson, & O'Leary, 1998). Over time, the dispute between the loggers and self-identified environmentalists grew along with their resentment towards each other (Satterfield, 2004).

In 1964, Congress passed The Wilderness Protection Act, which became largely disputed in response to fear that the act would end the logging industry of the PNW (Freudenburg, Wilson, & O'Leary, 1998). Due to the economic value of a single old growth tree, commercial logging sites had primarily been established in old growth forests (Rajala, 1998). However, ongoing logging practices affected many of the old-growth forest inhabitants. In 1990, the spotted owl received a threatened status from the United States Fish and Wildlife Service, who claimed that this status was largely in part to the loss of habitat for the old-growth forest-dwelling species. As a result, logging had to cease in all old-growth forests. This caused the logging-environmentalist dispute to escalate, which increased the riff and tension between the two groups (Freudenburg, Wilson, & O'Leary, 1998; Satterfield, 2004; Satchell, 1990; Ruud & Sprague, 2000).

Analysis of the Old-Growth, Spotted Owl Argument

The contrasting philosophical arguments of loggers and environmentalists.

The dispute over logging old-growth forests and protecting habitat for spotted owls serves as one of the most important influencers affecting the relationship between loggers and environmentalists. The argument over old-growth forests became polarized between the two groups. While the argument had deeper roots that divided the two groups, much of the argument presented itself as distaste and distrust. Loggers were described as "drunk," "brutish," or "aggressive" and environmentalists were described as "tree huggers" and "too emotional" (Satterfield, 2004). Freidenburg and Gramling (1993)

also noted that logging companies in the PNW would characterize environmentalists as unreasonable. They went on to describe "pro-logging rallies that feature the burning of environmentalists in effigy, and a bumper sticker that [reads] 'If you're out of work, and hungry, eat an environmentalist.'" (Freudenburg & Gramling, 1993, p. 13).

Two researchers, Ruud and Sprague, examined the argument between self-identified environmentalists and loggers by conducting interviews with the two groups. Their interview questionnaire consisted of open-ended questions with the aim to break down the argument into its component parts to determine what was driving the differing philosophical stances (Ruud & Sprague, 2000). Their research suggests that the argument consists of four contrasting philosophical components.

Ruud and Sprague claimed that the environmentalist's argument was supported, or rooted, in four primary ideas: connection, corporate greed, longevity, and global impact (2000). The first is an emphasis on the connections people form. This could be the spiritual connection people form with nature, their connection to community, and their connection to the larger population/environment in the world. There is also a focus on the impact an individual's actions have and the consequences for those actions and decisions. The second idea is that environmentalists believe corporations are fueled by corporate greed causing them to not see the many values the environment has, only the possible economic value. The third idea that environmentalists have is that they tend to think in longer time scales—their "temporal orientation" is in terms of generations. The fourth idea is that local negative environmental impacts have a larger impact on the global environment—their "spatial orientation" is very global (Ruud & Sprague, 2000).

Ruud and Sprague claimed that the philosophical argument proposed by loggers consisted of four primary ideas as well: self-identity, economic interest, longevity, and local impact (2000) (These ideas may be helpful later and inform your discussion of your results). The first idea places emphasis on how loggers see themselves and their part in the larger logging industry. Ruud and Sprague claimed that loggers see themselves as a cog in the larger machine of the logging industry (2000). The meaning in that metaphor is centered around how loggers don't necessarily think they have power in the dynamics—this is a key factor in how loggers view the industry and their role in it. The second idea is that loggers have a shared economic interest that rationalizes the corporate intentions of the logging industry. The authors cited "the golden rule" which is that "he who has the gold makes the rules" (Ruud & Sprague, 2000). The rule, again, emphasizes loggers' lack of power in the logging industry dynamics. The third idea is that loggers' "temporal orientation" is a much shorter timescale. They noted that only one logger mentioned the temporal scale of generations showing that most loggers think on a shorter time scale. The fourth, and final, idea is that loggers' "spatial orientation" looks at a local scale with little, to no, thought of the impact local actions have on the global environment (Ruud & Sprague, 2000).

Metathinking about the old-growth, spotted owl dispute.

One should consider an outsider lens when thinking about the spotted owl dispute and the conflict between loggers and environmentalists. The two groups, loggers and environmentalists, have become increasingly polarized, preventing them from understanding the other side's perspective (Satterfield, 2004; Satchell, 1990).

The Final Forest, a foundational book that examines the historical argument, considers perspectives from individuals, groups, and stakeholders involved in the dispute (Dietrich, 2010). One interesting analogy written about in *The Final Forest* recounts a story about mill workers in Alabama. Because the mill workers were in Alabama, not the Pacific Northwest, they were removed from any immediate sentiments or emotions surrounding the spotted owl, old-growth forest debate. The mill workers displayed fervent support for protecting and conserving the Pacific Northwest old-growth forests. The mill workers in Alabama wanted to protect the old growth forests because they appreciated the ecological and cultural value in preserving these unique forests. The Alabama mill workers may have understood the economic implications of removing the old-growth, but they also saw the value old-growth forests bring to the history and community of the Pacific Northwest (Dietrich, 2010).

An additional benefit to being an outsider in the spotted owl, old-growth dispute is that the emotions that surround it are not as strong as if one was actively involved in the dispute. This can be the case for researchers who seek to report what they find. Freudenburg and Gramling made an interesting observation in their 1994 article:

> Even in the specific case of the controversy over logging in the Pacific Northwest, while we do not claim to be as knowledgeable [...] we have followed the controversy, at least in terms of mass media accounts [...] [we observed] many of the environmental leaders who have been most active in lobbying for an end to the logging of old-growth timber have also been active in lobbying for worker retraining, extended unemployment benefits, and so forth. This remains true

> despite logging company advertising that refers to "unreasonable environmentalists," pro-logging rallies (13).

Freudenburg and Gramling's article sought to understand the connections between resource extraction and rural poverty and how assumptions affect resource extraction industries. In the above quote, Freudenburg and Gramling attempt to demonstrate how assumptions made by parties involved in the dispute have widened the gap between them. The authors followed this statement immediately with a paragraph on the need for more research on this topic and the impacts of the dispute on forest-dependent communities.

Another important consideration when thinking about the spotted owl, old-growth forest dispute, involves the idea of who is responsible for the decision to log. Assuming that Ruud and Sprague are correct in their argument that loggers are cogs in the larger logging industry, the decision, and want, to log old-growth forests is, therefore, not their own (2000). This idea is further supported by culture theory[12] as well (Price, Walker, & Boschetti, 2013). In the sense that people will act in ways that they feel fit their culture.

Job losses in the industry.

The logging industry is considered an extractive industry and is therefore included in extractive industries research when looking at job trends. The logging industry is considered an extractive industry because a resource is being removed from the ground and extracted. The logging industry is can also be seen as agriculture – a monoculture

[12] *Culture theory*. "Environmental risks become public problems via battles over subjective views of contested ways of life and related social psychological orientations, not on the basis of scientific evidence" (Dunlap & Brulle, 2015, 340).

crop. This is because after an area is logged, the area is replanted with the ratio of about 3 newly planted trees to 1 felled tree. When thinking about job trends within extractive industries and agriculture there has been a decline in jobs since the 1920s (Freudenburg & Gramling, 1993). Logging industry jobs specifically have decreased by 30,000 between 1990 and 2000 (Charnley, McLain, & Donoghue, 2008)

The attempts to explain the loss of jobs within the industry have led many to consider the old-growth, spotted owl dispute as a catalyst for the job losses. There have been repercussions of logging being halted in old-growth forests including:

> Social, economic, and psychological hardship for workers and their families resulting from reduced job security and benefits; declining wages and occupational status; the breaking of social bonds held with other workers, the firms that employed them, and their communities; the stress of having to relocate; and the loss of occupational identity and a way of life (Charnley, McLain, & Donoghue, 2008, 10-11).

Charnley, McLain, and Donoghue explored the relationship between the Northwest Forest Plan and logging communities dependent on forest resource extraction (2008). The Northwest Forest Plan was published in 1994 and created a working plan for allocating the forest lands of the Pacific Northwest to preserve biodiversity (Forest Service & Bureau of Land Management, 1994). The plan was written mainly as a response to the old-growth, spotted owl dispute and outlined how the region will manage and protect forests and watersheds (Forest Service & Bureau of Land Management, 1994). Figure 2 is from Freudenburg and Gramling's 1993 article examining extractive industries and rural poverty. The data they used for the 1920-1960s is from Historical Statistics of the

United States, Colonial Times to 1970. The data they used for 1970-1990 is from Statistical Abstracts of the United States. This image corroborates the trend of job loss within the logging industry.

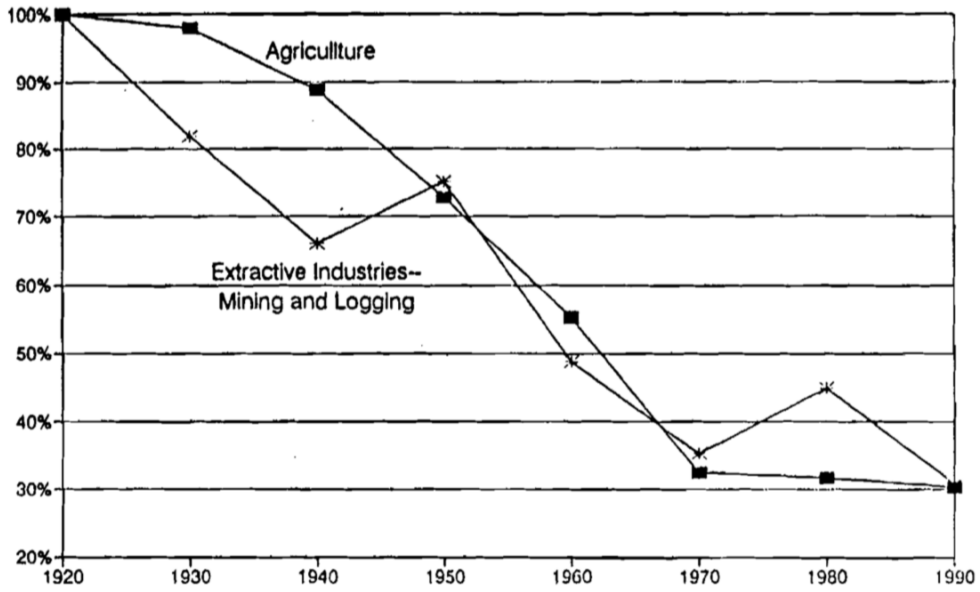

Figure 2. Extractive industries compared to rural poverty.
Credit for this plot: Freudenburg, W. R., & Gramling, R. (1994). Natural resources and rural poverty: a coser look. *Society & Natural Resources*, 7(1), 5. https://doi.org/10.1080/08941929409380841

The article "Forty Years of Spotted Owls? A Longitudinal Analysis of Logging Industry Job Losses" in *Sociological Perspectives* investigates whether or not the spotted owl is responsible for job losses in the logging industry and suggests that the ranking of "endangered" may actually have cutailed job losses for loggers (Freudenburg, Wilson, & O'Leary, 1998). This curtail in job loss is likely due to increased regulation requiring more people to do specialized work. The trend in logging job losses sharply decreased from 1945 to about 1960. The old-growth forest dispute started around 1960 and the spotted owl was officially classified in 1990. Throughout those decades the decrease in

total logging/milling jobs slowed markedly compared to before the old-growth, spotted owl dispute began (Freudenburg, Wilson, & O'Leary, 1998). Figure 3 shows the trend of job loss along with the trend for how much timber was harvested as measured in billions of board feet.

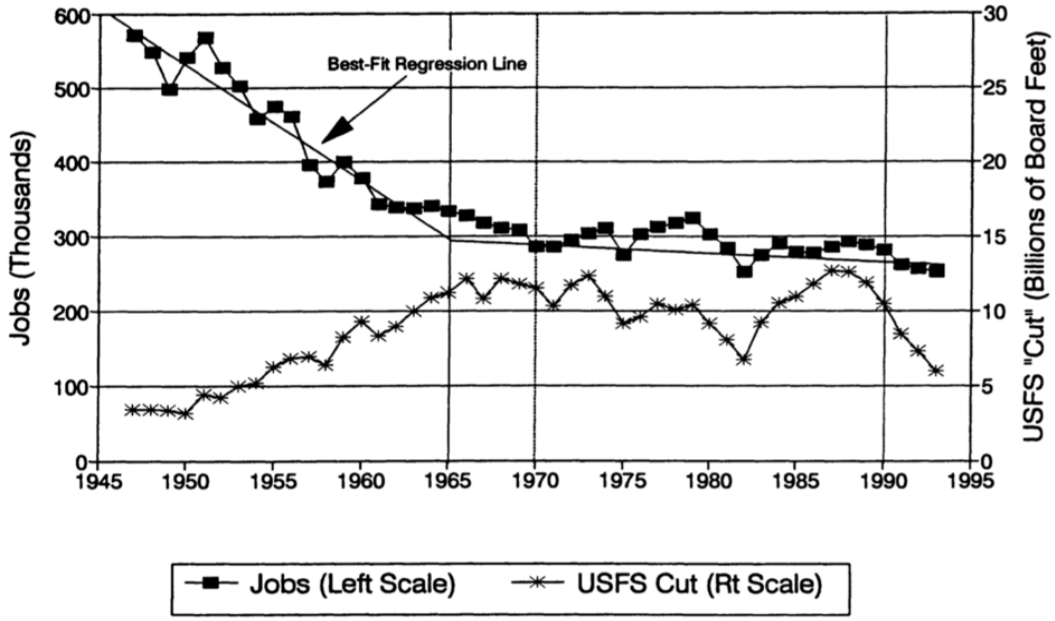

Figure 3. Logging industry job loss and USFS board feet cut.

Credit for this plot: Freudenburg, W. R., Wilson, L. J., & O'Leary, D. J. (1998). Forty years of spotted owls? A longitudinal analysis of logging industry job losses. *Sociological Perspectives*, 41(1), 1–26. https://doi.org/10.2307/1389351

Freudenburg, Wilson, and O'Leary found that the increase in regulations surrounding the PNW forests and, more broadly in the logging industry itself, actually saved many logging jobs (1998). With the increased demand for monitoring forest health, the logging industry saw an increase of job variety.

Chapter 3: Methods

This research is an exploratory study designed to document the ecological attitudes of loggers in the Pacific Northwest (PNW). As an exploratory study, it seeks to contribute to a gap in the empirical literature with respect to loggers and how they view the environment. A logger is defined here as any person who works for, or with, a contract logging company and spends the majority of their work time in nature whether that is cutting down trees, building and maintaining access roads, or surveying work sites. Beyond documenting responses to questions about their ecological attitudes, information was gathered about each participant's formative experiences in nature and their socioeconomic and demographic backgrounds. Here, formative experiences in nature are defined as a time or place when a person developed a relationship to nature and natural places during, commonly during their youth, that has affected them as an adult (Chawla, 1999). Additionally, the researcher had preliminary conversations with loggers from Pulley Logging Corporation. The conversations were used to inform the survey design and to gain a better understanding of the current logging industry in the PNW.

The variables briefly listed above have been identified by previous research as ecological attitude predictors and will be analyzed as independent variables. The value scored from the New Ecological Paradigm (NEP) scale was treated as the dependent variable of this study. The NEP scale is covered in depth in the literature review of this thesis. The surveys used in this study contained 28 items—15 from the NEP scale and 13 items regarding work, formative years in nature, and socioeconomic and demographic backgrounds. The surveys were used for gathering primary data and there were no identifiable traits collected with the surveys.

Study Population

The study population in this research are people who work in the woods as part of the logging industry in Washington State. Although the population of interest was loggers, due to the limited responses the researcher decided to ask for, and accept, surveys from anyone involved in the logging industry that spends more than half of their work week in the woods. Making the main criterion that respondents spend the majority of their work time, more than half of their work time per week, in the woods--or nature. The logging companies served as cluster samples each receiving between 1 and 6 surveys. Cluster samples are a form of surveying in which groups of multiple individuals from the same population subgroup are sampled. This adds a level of convenience to the sampling method. An additional source of convenience was having the company manager, or equivalent, identify respondents to distribute the surveys to. For this study, all individuals from one company comprise a subgroup within the larger study population. The researcher obtained a list of logging companies in Washington state through the Washington Contract Loggers Association, Inc. (WCLA). Logging companies were randomly selected from WCLAs list excluding those that operate in Eastern Washington. Later, the president of the WCLA reached out to the association asking if anyone would be willing to participate and many of the responses were gathered because of this. The individual loggers who completed the survey were then identified by the company manager or equivalent.

Survey Distribution

The study population was people who work in the logging industry and to compile a list of those individuals, the WCLA was contacted. The WCLA has a list of

everyone in Washington that has received a Master Logger certification. For people who work in the logging industry in Washington, a Master Logger certification is required to harvest timber on government property. As a result of this requirement, almost everyone who works in the logging industry has earned this certification. Appendix B contains the process a person goes through to earn that certificate as recorded by the WCLA (Washington Contract Loggers Association, Inc., 2019). The list was narrowed removing all individuals who live, and work, on the East side of the Cascade Mountain range. The researcher then cold called companies that were randomly selected from the narrowed down list of loggers in Washington State. The research was then explained to the person who answered the phone – this could've been secretaries, managers, or owners. The research was explained and they were asked to participate. If they agreed, the researcher offered to meet them to distribute the surveys in person unless the respondents preferred otherwise.

This method of getting individuals to participate was not very successful. Out of 120 calls, only 20 of those calls yielded interest to participate in this study. The most successful call ended with an invitation to attend club meetings – one informal gathering and one formal club meeting for the International Concatenated Order of Hoo-Hoo. Following the Hoo-Hoo club meeting, the president of the WCLA responded to the researcher about finding people who would be interested in participating. The president reached out to the WCLA members and 15 companies came forward showing interest in participating. The reason this process has been included is to illustrate the importance of getting support from prominent members in the logging industry community. This process also introduced a substantial amount of convenience to the sampling method. For

those interested in participating, the surveys were either hand delivered or mailed. The surveys were distributed with a brief description of the study, a letter of consent, a pre-addressed and pre-stamped envelope, and a $2 bill. The $2 bill was included as compensation for the respondents' time to answer the survey and return it.

Variables Overview

Variables were identified based on previous research that sought to describe a population (Chawla, 1999; Van der Werff, Steg, & Keizer, 2012). The dependent variable was ecological attitudes as measured by the NEP scale. The independent variables were identified as jobs and length of time in the industry, formative experiences in nature, and socioeconomic and demographic background (Laidley, 2013; Fortmann & Kusel, 1990). Table 4 contains information and reasonings for each variable that was measured in the study.

Table 4. The variable, it's type, and how it's measured.

Variable (Type of variable)	**What is measured?**	**How is it measured?**	**Why determined to be included?**
NEP (dependent)	An approximation of the respondent's ecological attitude	Using the NEP scale, the respondent selects a level of agreement for each statement in the scale and the researcher uses a numerical value for the selected level of agreement to translate the data into numerical values	NEP was determined to be used because it is the most widely used scale to assess ecological attitudes (Hawcroft & Milfont, 2010).
Job and length of time in the industry (independent)	The respondent's job in the logging industry and how long they have been a	Respondents were asked to identify their occupation and how long they have been in the logging industry	This study is investigating the logging field and some research has found that ecological attitudes can be negatively affected if a

	member of that industry		person works in an extractive industry for a long time
Formative experiences in nature (independent)	How much time a person spent in nature during you, whether that time was leisure or work, and significant memories from childhood involving nature	Respondents were asked to indicate if they spent a lot of time in nature as a child; indicate if that time was work, leisure, a combination of the two, or none; identify if they had any significant memories involving nature and share those memories or activities	Chawla found that among environmentalists, those with pro-ecological attitudes spent time in nature during youth whether that was as a period of time, activities, or a significant memory involving nature (1999).
Socioeconomic status and demographic background (independent)	Income, education level, occupation, ethnicity	Asking for respondents to indicate those things from a list by circling the applicable identifier or by filling in a blank (e.g. age had a blank to be filled in).	Other studies have found that patterns of correlation between socioeconomic status and demographic background and ecological attitudes (Laidley, 2013; Fortmann & Kusel, 1990; Pienaar, Lew, & Wallmo, 2013; Hawcroft & Milfont, 2010)

NEP scale.

The surveys use the 15 item New Ecological Paradigm (NEP) Scale with 7-point Likert responses ranging from Strongly Disagree to Strongly Agree including an Unsure category. The score associated with a respondent's NEP Scale was used to quantify an individuals' ecological attitude (Hawcroft & Milfont, 2010). The NEP Scale was chosen over other measures of ecological attitude as it is the most widely used scale measuring ecological attitudes (Hawcroft & Milfont, 2010; Dunlap, Van Liere, Mertig, & Jones, 2000; Dunlap, 2010). The revised, 2000 NEP Scale was used because it contains more

up-to-date terminology, has a more balanced pro- and anti- ecological response item list, and has been found internally valid (Hawcroft & Milfont, 2010; Dunlap et al., 2000; Zhu & Lu, 2017). Being internally valid means the NEP scale measures what it intends to and appears to accurately measure a person's ecological attitude. Internal validity is measured using Cronbach's alpha – both Dunlap et al. and Hawcroft and Milfont found a high Cronbach's alpha of 0.83.

Additionally, responses to the NEP scale were categorized as limits of growth, anti-anthropocentrism, fragility of nature, rejection of exemptionalism, and ecocrisis possibility (Dunlap, et al.; 2000) (see Table 1 for definitions of each category and Table 5 for descriptions of each NEP category). Each category represents an aspect of the NEP. The NEP scale combines the main categories of the NEP that determine a respondents' ecological attitude within that paradigm (see Literature Review, New Ecological Paradigm).

Table 5. Descriptions of NEP facets using the definitions from Atav, Altunoğlu, & Sönmez (2015, 1394).

Category or facet	What the category seeks to measure	What the response to the variable indicates
Limit of growth	the limitation of our environment to support the continued expansion of human-kind	Agreeing with statements about limiting human growth shows a pro-ecological attitude
Anti-anthropocentrism	sees humans as not being the most superior creature in existence, contrary to anthropocentrism	Agreeing with statements about anti-anthropocentrism demonstrates a pro-ecological attitude
Fragility of nature	nature cannot recover from the continued human destruction of nature	Understanding and accepting that nature is fragile indicates a pro-ecological attitude
Rejection of exemptionalism	comes from the belief that humans are 'exempt' from natural forces and to reject	Rejecting the belief that humans are superior and

	that belief again shows that human are intertwined with nature	'exempt' indicates a pro-ecological attitude
Ecocrisis possibility	Tests for the respondent's belief that earth, or nature, is nearing a point of ecological crisis that humans will not recover from	Accepting that an ecocrisis is imminent if humans don't change their actions indicates a pro-ecological attitude

Demographic assessment.

The remainder of the survey was comprised of 13 questions about the socioeconomic and demographic background of respondents and those questions are addressed and described further here. There were 2 questions about the individuals' work in the logging industry and the length of time they have been involved in the industry. These 2 questions were treated as categorical data. Next, there were 3 questions about how the respondent spent time in nature during their youth. This data was also treated as categorical variables with pre-determined responses. The last question of the time spent in nature during youth asked about formative experiences in nature with an open-ended response option.

The open-ended part of the question asked the respondent to describe a significant memory of nature during their youth. Previous research into ecological attitudes found that time spent in nature during youth was formative for most people with pro-ecological attitudes (Chawla, 1999; Van der Werff, Steg, & Keizer, 2012; Jones, Shaw, Ross, Witt, & Pinner, 2016). Lastly, there were 8 demographic questions about the location the person grew up in, the location they live at now, and socioeconomic and demographic status. In previous studies and meta-data analysis, researchers found that socioeconomic and demographic factors can impact a person's pro-ecological attitude (Keefer, Finley,

Luloff, &McDill, 2002; Hawcroft & Milfront, 2010). For example, people that are younger and more-educated often have a more pro-ecological attitude.

See Appendix A for the complete list of survey questions and possible responses.

Quantitative Analysis

The surveys were analyzed quantitatively and in groups and subgroups to get a holistic understanding of the sample. The quantitative results were reported fully to establish a baseline statistical representation of the study population. While there were open-ended response options in the survey, qualitative analysis is not included in this thesis. This is because some responses were single words and others were left blank making qualitative analysis too difficult requiring too much inference to be sure of an accurate representation. First, the descriptive and summary statistics for the sample are recorded to describe the sample population. Next, the NEP scores were analyzed. The NEP scores were calculated using the 7-point likert scale assigning a value of 1 to Strongly Disagree, 2 to Disagree, 3 to Mildly Disagree, 4 to Unsure, 5 to Mildly Agree, 6 to Agree, and 7 to Strongly Agree. For the even numbered items that were written to be anti-environmental statements, the value assigned to the likert responses were reverse coded. In this way, Strongly Disagree had a value of 7, Disagree was 6, and so on. As a result of this coding process, respondents' scores could then range from 15 to 105. A low NEP score indicates a less pro-ecological attitude and a high score indicates a more pro-ecological attitude. For the rest of the statistical analysis involving NEP scores, the median values were used because the sample size was small. However, the analytical statistics presented in a table near the end of the Results section does use the average values. This was because the calculation was easier.

Cronbach's alpha was examined at two points in the analysis process. Both times Cronbach's alpha was calculated to see how this research's scale compared to the other previously found value of 0.83 (Dunlap, et al., 2000; Hawcroft & Milfont, 2010). The first time Cronbach's alpha was calculated was to look at the sample entirely. The second time Cronbach's alpha was calculated was after the sample had been categorized into "loggers" and "non-loggers." The NEP scores were analyzed as a whole, by facet, and by item. Each of those analyses used the median score. The analytical statistics for this study are reported in a table comparing the dependent variable, NEP score, to the independent variables. As stated earlier, the analytical stats used the average instead of the median. Multivariate tables were calculated in .jmp to look for significant relationships between the variables.

The NEP scores were compared to two other studies in Washington. The total mean score from this study was compared to the total mean from a 2015 study of a representative sample of 650 Washington residents (Steel, Pierce, Warner, & Lovrich). The mean value for this sample was used because the 2015 study only reported the mean. The individual item scores from this study were compared to the reported item scores from the 2000 paper publishing the revised scale (Dunlap et al., 2000). These comparisons were done to see how this sample compared to two representative samples of Washington residents.

Ethics

The survey and sampling process was approved by the Human Subjects Review Board at The Evergreen State College. There was no identifiable information gathered from the respondents

Chapter 4: Results

This section outlines the results gathered from the returned surveys. The research questions motivating this research were:

> What are the pro-ecological attitudes of people who work in the logging industry?
>
> Is the NEP Scale a good instrument in measuring the ecological attitudes of people who work in the logging industry?

4.1 Respondent Data

The population for this sample was individuals who are certified as Master Loggers in Washington State (see Appendix B for the description of how an individual earns a Master Logger certification) (Master Logger Program List, 2019). Respondents were sampled from that population of 997 certified Master Loggers in Washington State (ibid). Sampling was done using a convenience sampling method by contacting individuals based on recommendations from previous respondents or from the President of the Washington Contract Loggers Association. Of the 133 surveys sent out, 42 were returned yielding a response rate of 31.58%. However, only 36 surveys were used in analysis. This was because three surveys were returned after the cut-off date and the other three surveys indicated that the respondents did not spend more than half of their work week in nature. Of the 36 respondents, 35 were male and 1 was female. The average age of the respondents was 58.44 with the youngest respondent being 29 and the oldest respondent being 82. All, but one, respondents indicated they were "White/Caucasian" with the exception indicating that they preferred to not answer. 25.64% of the respondents indicated they had a high school graduate, diploma or the equivalent; 17.95% indicated they had some college credit, but no degree; 2.56% of the respondents earned a

Trade or Technical degree; 7.69% indicated they had earned an Associate's Degree; 28.21% indicated they earned a Bachelor's Degree; and 10.26% indicated they had earned a Master's Degree. The average number of children for the respondents was 2.51. As for the reported annual income, 5.13% of the respondents reported earning between $20,000 - $39,999 annually; 2.56% reported earning between $40,000 - $59,999 annually; 20.51% reported earning between $60,000 - $79,999 annually, 25.64% reported earning between $80,000 - $99,999 annually; and 35.90% reported earning more than $100,000 annually.

Table 6 contains the summary statistics for the independent variables of the

Independent Variables	Descriptive Statistics
Sex *(n=36)*	
Male	97 % (*n=35*)
Female	3% (*n=1*)
Age (*n=36*)	
20-29	3% (*n=1*)
30-39	6% (*n=2*)
40-49	17% (*n=6*)
50-59	25% (*n=9*)
60-69	25% (*n=9*)
70-79	22% (*n=8*)
80-89	3% (*n=1*)
Job (*n=36*)	
Logger	44 % (*n=16*)
Non-logger	56% (*n=20*)
Years in industry (*n=35*)	
<35	43% (*n=15*)
35-44	23% (*n=8*)
45-54	20% (*n=7*)
55-64	11% (*n=4*)
65+	3% (*n=1*)
Time in Nature (*n=36*)	
Leisure	8% (*n=3*)
Mostly leisure	31% (*n=11*)
Roughly equal parts	44% (*n=16*)
Mostly work	14% (*n=5*)
Work	3% (*n=1*)
Education (*n=36*)	
High school diploma or equivalent	26% (*n=10*)
Some college credit, no degree	18% (*n=7*)
Trade/technical degree	3% (*n=1*)
Associates degree	8% (*n=3*)
Bachelor's degree	28% (*n=11*)
Master's degree	11% (*n=4*)
Average Annual Income (*n=35*)	
$20,000 - $39,999	6% (*n=2*)
$40,000 - $59,999	3% (*n=1*)
$60,000 - $79,999	23% (*n=8*)
$80,000 - $99,999	26% (*n=10*)
$100,000 +	40% (*n=14*)

respondents.

Job

Respondents were asked to indicate what their job within the industry was and this yielded 10 categories: Crew Supervisor, Equipment Operator, Forest Engineer, Forester, Land Management, Log Buyer, Logger, Owner, Timber Cutter, and Timber Manager. The position descriptions indicated by the survey respondents were then re-categorized into 2 final categories: Loggers and Non-Loggers to make analysis simpler. Loggers were all positions that would work in tree extraction of some kind. Crew Supervisor, Equipment Operator, Timber Cutter, and Timber Manager were re-categorized as Logger. These positions also fit the description of "logger[13]" as described in the Methods section. The non-logger category was comprised of Forest Engineer, Forester, Land Management, and Log Buyer.

Time Spent in Nature

Respondents were asked to characterize how they spent their time in nature during their youth given a set of options. The response options were leisure, mostly leisure, roughly equal parts work and leisure, mostly work, and work. In this sample, 8% indicated their time was spent as leisure, 31% as mostly leisure, 44% as roughly equal parts work and leisure, 14% as mostly work, and 3% as work.

[13] From the Methods section of this thesis: "A logger is defined here as any person who works for, or with, a contract logging company and spends the majority of their work time in nature whether that is cutting down trees, building and maintaining access roads, or surveying work sites."

Table 6 Profile of respondents.

Independent Variables	Descriptive Statistics
Sex *(n=36)*	
Male	97 % (*n=35*)
Female	3% (*n=1*)
Age (*n=36*)	
20-29	3% (*n=1*)
30-39	6% (*n=2*)
40-49	17% (*n=6*)
50-59	25% (*n=9*)
60-69	25% (*n=9*)
70-79	22% (*n=8*)
80-89	3% (*n=1*)
Job (*n=36*)	
Logger	44 % (*n=16*)
Non-logger	56% (*n=20*)
Years in industry (*n=35*)	
<35	43% (*n=15*)
35-44	23% (*n=8*)
45-54	20% (*n=7*)
55-64	11% (*n=4*)
65+	3% (*n=1*)
Time in Nature (*n=36*)	
Leisure	8% (*n=3*)
Mostly leisure	31% (*n=11*)
Roughly equal parts	44% (*n=16*)
Mostly work	14% (*n=5*)
Work	3% (*n=1*)
Education (*n=36*)	
High school diploma or equivalent	26% (*n=10*)
Some college credit, no degree	18% (*n=7*)
Trade/technical degree	3% (*n=1*)
Associates degree	8% (*n=3*)
Bachelor's degree	28% (*n=11*)
Master's degree	11% (*n=4*)
Average Annual Income (*n=35*)	
$20,000 - $39,999	6% (*n=2*)
$40,000 - $59,999	3% (*n=1*)
$60,000 - $79,999	23% (*n=8*)
$80,000 - $99,999	26% (*n=10*)
$100,000 +	40% (*n=14*)

Location

Respondents were asked where they grew up and where they live now. 92% of the respondents live in the same region they grew up in. The other 8% moved from one side of Washington State to the other or moved from another state.

NEP scores

Table 7 shows the percentage of agreement of the NEP items for all of the respondents. Agreement with odd-numbered items indicates a pro-ecological attitude and a disagreement with the even-numbered items indicates a pro-ecological attitude. The categories are the response options – Strongly Disagree (SD), Disagree(D), Mildly Disagree (MD), Unsure(U), Mildly Agree (MA), Agree (A), and Strongly Agree (SA). Figure 4 shows a bar graph of the respondents' total NEP scores separated into score intervals 30-39, 40-49, 50-59, 60-69, 70-79, and 80-89. The median NEP score was 52. The minimum score was 32, the 25th percentile was 44.75, the 75th percentile was 62, and the maximum NEP score was 86.

Table 7. Percentages of agreement for NEP items of all participants.

Item	SD	D	MD	U	MA	A	SA
1. We are approaching the limit of the number of people the earth can support.	19.44%	13.89%	13.89%	19.44%	13.89%	13.89%	2.78%
2. Humans have the right to modify the natural environment to suit their needs.	2.78%	8.33%	13.89%	2.70%	41.67%	41.67%	13.89%
3. When humans interfere with nature it often produces disastrous consequences.	2.78%	33.33%	33.33%	0.00%	16.67%	2.78%	11.11%
4. Human ingenuity will ensure that we do NOT make the earth unlivable.	0.00%	2.78%	13.89%	16.67%	25.00%	25.00%	16.67%
5. Humans are severely abusing the environment.	8.33%	36.11%	27.78%	8.33%	11.11%	5.56%	2.78%
6. The earth has plenty of natural resources if we just learn how to develop them.	2.78%	5.56%	2.78%	5.56%	30.56%	27.78%	25.00%

7. Plants and animals have as much right as humans to exist.	11.11%	19.44%	25.00%	11.11%	19.44%	11.11%	2.78%
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	2.78%	11.11%	27.78%	22.22%	22.22%	13.89%	0.00%
9. Despite our special abilities humans are still subject to the laws of nature.	0.00%	2.78%	8.33%	8.33%	19.44%	27.78%	33.33%
10. The so-called 'ecological crisis' facing humankind has been greatly exaggerated.	2.78%	5.56%	2.78%	2.78%	30.56%	25.00%	30.56%
11. The earth is like a spaceship with very limited room and resources.	16.67%	27.78%	13.89%	8.33%	11.11%	16.67%	5.56%
12. Humans were meant to rule over the rest of nature.	8.33%	16.67%	16.67%	11.11%	16.67%	16.67%	13.89%
13. The balance of nature is very delicate and easily upset.	0.00%	27.78%	22.22%	13.89%	13.89%	13.89%	8.33%
14. Humans will eventually learn enough about how nature works to be able to control it.	16.67%	19.44%	22.22%	22.22%	13.89%	5.56%	0.00%
15. If things continue on their present course, we will soon experience a major ecological catastrophe.	27.78%	36.11%	13.89%	13.89%	5.56%	2.78%	0.00%

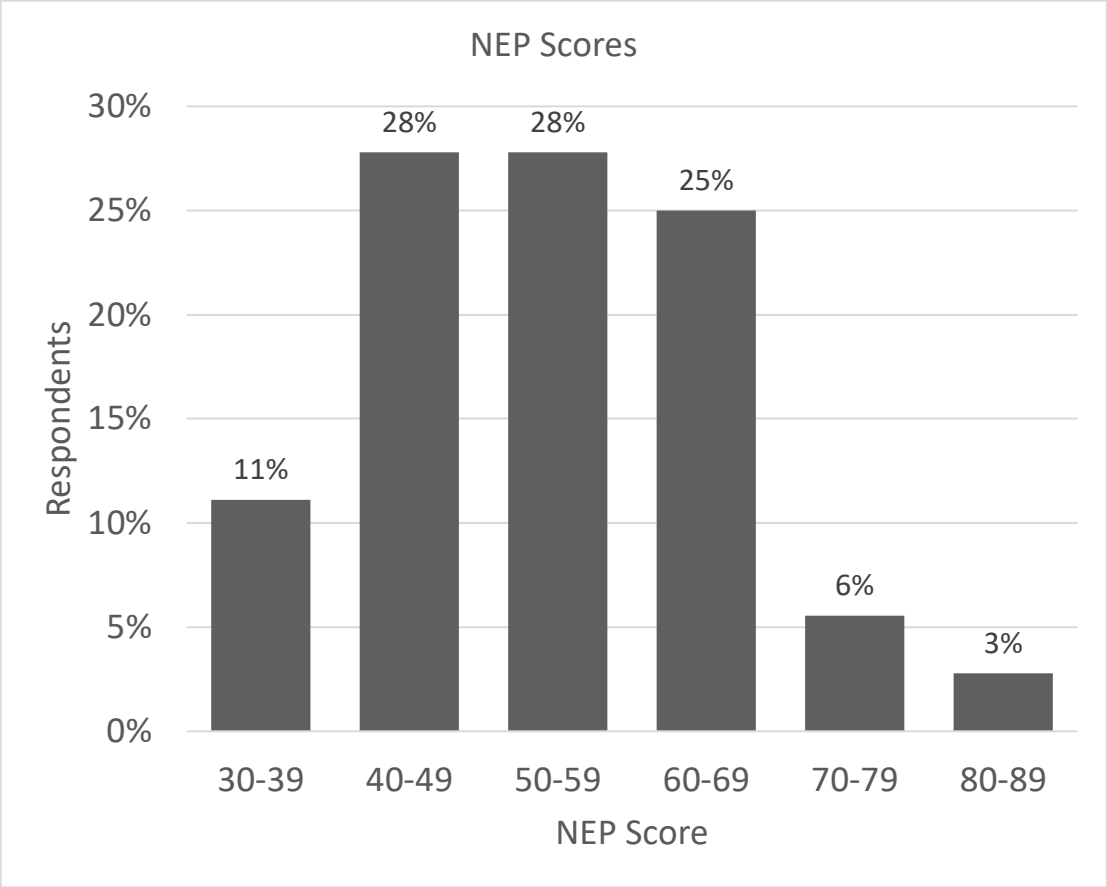

Figure 4. NEP scores bar graph.

Cronbach's alpha was calculated to test the internal validity and reliability of the instrument – the NEP Scale – being used to measure pro-ecological attitudes. Cronbach's alpha for the data set (all 36 responses) is 0.79 and because this value is greater than 0.7, the instrument measured what it intended to measure. This means that the scale measured the respondents' pro-ecological attitudes as they fit within the New Ecological Paradigm. Previous research has found a Cronbach's alpha of 0.83 (Hawcroft & Milfont, 2010; Dunlap, Van Liere, Mertig, & Jones, 2000). While a higher value of Cronbach's alpha signals that the scale reliably measured a latent variable within the sample, it does not imply unidimensionality. This means the scale is measuring ecological attitudes, but it is

not excluding other aspects that could influence ecological attitudes including other latent constructs.

Multivariate analysis of the NEP scores was performed to look for relationships between facets and the total score. Appendix E. contains the table of correlations and the associated correlation probability for the NEP scores.

The quartiles of NEP scores were broken apart into scores 32 – 44, 45 – 51, 52 – 61, and 62 – 86. These quartiles for the NEP scores were used for all of the analysis of NEP scores and independent variables.

NEP score by item.

The next few pages will explore each item individually to get a better understanding of the sample's represented level of agreement for a single statement.

Item 1.

This first item had a median score of 4. This could mean that the group was unsure of the level of agreement to the first statement. This item represents the limit to growth facet.

Item 2.

On item 2, the median score was 3. A score of three on this item correlates to mildly agreeing with the presented statement. This item represents the anti-anthropocentrism facet.

Item 3.

The median value for item 3 was a 3. This score indicates mild disagreement with the presented statement. This item represents the fragile balance of nature facet.

Item 4.

The median value for item 4 was a 3 indicating mild agreement with the presented statement. This item represents the rejection of exemptionalism facet.

Item 5.

For item 5, the median value from the sample was 3. A score of 3 correlates to mild disagreement. This item represents the possibility of an eco-crisis facet.

Item 6.

For item 6, the median value of the sample was a 2. On this item, a score of 2 indicates agreement with the presented statement. This item represents the limit to growth facet.

Item 7.

For this item, the median value from the sample was a 3. A score of 3 on this item indicates mild disagreement. This item represents the anti-anthropocentrism facet.

Item 8.

On item 8 the median score from the sample was a 4 indicating that the sample was unsure on their level of agreement with the presented statement. This item represents the fragile balance of nature facet.

Item 9.

On this item, the median score was a 6. On this item a score of 6 indicates that the sample agrees with the presented statement. This item represents the rejection of exemptionalism facet.

Item 10.

For item 10, the median score was 2. This indicates that the sample agreed with presented statement. This item represents the possibility of an eco-crisis facet.

Item 11.

The median value for this item was a 3 indicating that the sample mildly disagreed with the presented statement. This item represents the limit to growth facet.

Item 12.

For item 12, the median score was a 4 indicating the sample was generally unsure of their agreement with the presented statement. This item represents the anti-anthropocentrism facet.

Item 13.

Item 13 had a median score of 3.5. This indicates the sample was in the middle between unsure and mildly disagree for their level of agreement to the presented statement. This item represents the fragile balance of nature facet.

Item 14.

On item 14, the sample's median score was a 5. This score indicates that the sample mildly disagreed with the presented statement. This item represents the rejection of exemptionalism facet.

Item 15.

Item 15 had a median score of 2 indicating the sample mildly disagreed with the presented statement. This item represents the possibility of an eco-crisis facet.

Facet Scores

The NEP consists of five facets and each facet has three statements on the NEP scale. Facet scores are calculated the same way as individual items in the NEP scale – numerical values are assigned to the level of agreement indicated then added together to get the total facet score. Total facet scores range from 3 to 21 with higher values indicating a more pro-ecological attitude according to the NEP. This information is meaningful because it can show what the sample agrees with and what they don't. Looking at facet scores also breaks down a respondent's NEP score so that researchers can better understand how a respondent earned the NEP score they did. Limitations in finding meaning from these results are that researchers don't know why respondents answered the way they did, and each facet had a wide range of responses.

Limit of Growth.

The definition used for this facet is "the limitation of our environment to support the continued expansion of human-kind" (Atav, Altunoğlu, & Sönmez, 2015, 1394). Individuals who agree with statements within this facet present a pro-ecological attitude. Agreement with this facet would mean that individuals are aware of the implications of population growth and are aware of the environmental and ecological costs of overuse of natural resources. Within this facet, respondents scored between 3 and 18 with a median score of 9. Figure 5 shows how the sample scored in this facet by displaying the box and whisker plot representing the minimum, maximum, quartiles, and median score.

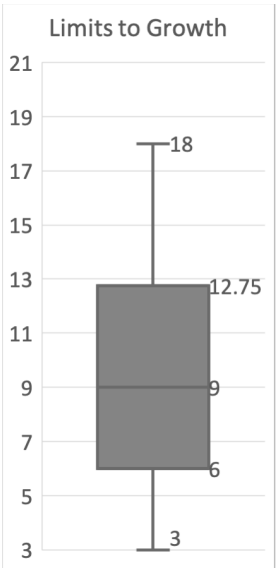

Figure 5. Limits to growth box-and-whisker plot.

Anti-anthropocentrism.

The definition used for this facet is that anti-anthropocentrism "sees humans as not being the most superior creature in existence, contrary to anthropocentrism" (Atav, Altunoğlu, & Sönmez, 2015, 1394). Agreement with the statements within this facet in the NEP Scale presents a pro-ecological attitude. Within this facet, respondents scored between 3 and 18 with a median score of 10.5. Figure 6 shows how the sample scored in the anti-anthropocentrism facet by displaying the box and whisker plot representing the minimum, maximum, quartiles, and median score.

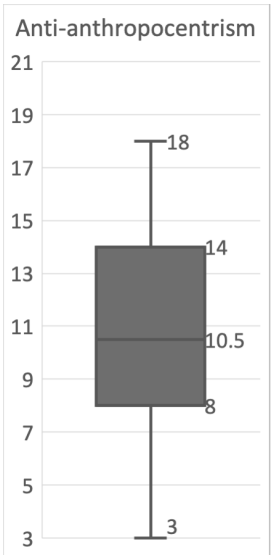

Figure 6. Anti-anthropocentrism box and whisker plot.

Fragile Balance of Nature.

The definition used for this facet is that "nature cannot recover from the continued human destruction of nature" (Atav, Altunoğlu, & Sönmez, 2015, 1394). By indicating agreement with this sentiment, respondents indicate that they support the idea that nature is fragile and the balance between humans and nature is a delicate one. Within this facet, respondents had scores between 6 and 20 with a median score of 10. Figure 7 shows how the sample scored in the fragile balance of nature facet by displaying the box and whisker plot representing the minimum, maximum, quartiles, and median score.

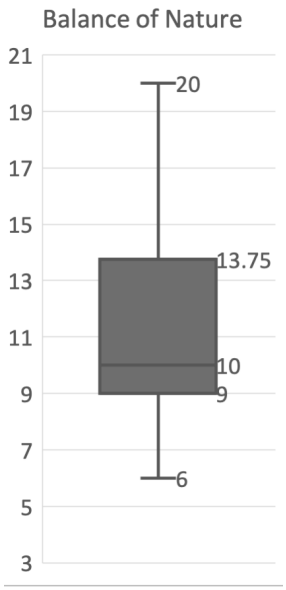

Figure 7. Balance of nature box and whisker plot.

Rejection of Exemptionalism.

The definition used for this facet is "it is based on the idea that the people who accept the New Ecological Paradigm are supposed to reject that human being is exempt from nature and the laws of nature" (Atav, Altunoğlu, & Sönmez, 2015, 1394). Agreeing with the idea in this facet would mean that the respondents likely believes that humans are not exempt from the consequences of their actions towards the environment and nature. Interestingly, this facet had the highest median score compared to the other facets and this facet had the highest minimum value. The minimum value for a respondent's total facet score was 8, the median was 13.5, and the highest value was 19. Additionally, the item that respondents scored the highest on, item 9, was addressing this facet. Respondents tended to agree with this facet more than the other four facets meaning respondents seem to agree with the idea that humans are not exempt from our actions towards the environment and nature. Figure 8 shows how the sample scored in the rejection of exemptionalism facet by displaying the box and whisker plot representing the minimum, maximum, quartiles, and median score.

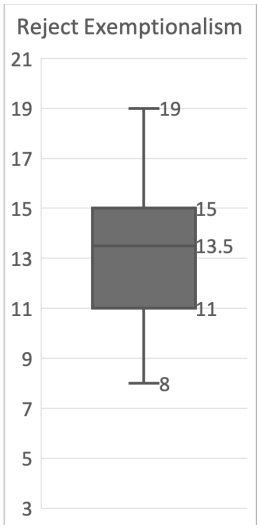

Figure 8. Reject exceptionalism box and whisker plot.

Eco-Crisis Possibility.

The definition used for this facet is "that human intervention in nature may lead to negative results at a disaster level that might be described as an eco-crisis" (Atav, Altunoğlu, & Sönmez, 2015, 1394). By agreeing with this, respondents are both agreeing that an eco-crisis is possible and that humans are responsible for that crisis. Within this facet, respondents had scores between 3 and 18 with a median score of 7.5 Figure 9 shows how the sample scored in the possibility of eco-crisis facet by displaying the box and whisker plot representing the minimum, maximum, quartiles, and median score.

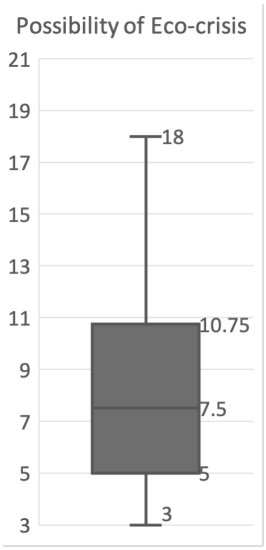

Figure 9. Possibility of eco-crisis box and whisker plot.

Analytical Statistics

The pro-ecological attitudes of people who work in the logging industry were compared to their time spent in age, job, how long they'd worked in the industry, how they spent time in nature during their youth, highest attained education, and average annual income. These were investigated to see if there was any relationship between NEP scores and the named independent variables. As addressed in the Literature Review of this thesis, previous research identified various variables about a person that can influence, even predict, the individuals' pro-ecological attitude. Table 8 analyzes the relationships between pro-ecological attitude and the independent variables tested for in the survey. The columns of the table are the total NEP score ranging from 15 to 105 and each total facet score ranging from 3 to 21. The values used are all averages of the respondents' scores that met the overlapping criteria. For example, the average value of

every respondent's NEP score is the value in the upper left of the table where total respondents overlap with NEP score.

Table 8. Pro-ecological attitude average by age, job and years in the logging industry, characterizing time spent in nature during youth, education level, and annual average income.

	NEP Score (range: 15 - 105)	Limit of Growth Facet (range 3-21)	Anti-anthropocentrism Facet (range 3-21)	Fragility of Nature Facet (range 3-21)	Rejection of Exemptionalism Facet (range 3-21)	Eco-crisis Possibility Facet (range 3-21)
Total Respondents *(n=36)*	52	9	10.5	10	13.5	7.5
Age *(n=36)*						
20-29	42	6	8	9	13	6
30-39	56	10.5	14.5	8.5	15	7.5
40-49	52.83	9.67	10.33	11.67	13.5	7.67
50-59	52.78	8.56	11.22	11	14.67	7.33
60-69	58.89	12.11	9.67	13.44	14.22	9.44
70-79	48.63	8.88	10.75	10.38	10.63	8
80-89	49	3	14	13	14	5
Job *(n=36)*						
Logger	49	8.38	9.75	10.88	13.13	6.88
Non-logger	56.5	10.55	11.55	11.9	13.65	8.85
Years in industry *(n=35)*						
<10	42	6	8	9	13	6
10-19	54.67	9.67	14.33	8.67	14.33	7.67
20-29	53.8	11.2	9.8	11.2	14.8	6.8
30-39	57.5	9.63	11.5	12.25	14.75	9.38
40-49	56.22	11.78	9.89	12.44	13.11	9
50-59	46.5	6.5	9.83	11.5	12.67	6
60+	49	8.67	12	10	10.33	8
Time in Nature *(n=36)*						

Leisure	50.67	10.67	8	11	13.67	7.33
Mostly leisure	53.33	10.11	12	9.89	13.44	7.89
Roughly equal parts	54.88	10.38	10.13	12.13	14.19	8.06
Mostly work	46.4	6.6	10.4	11	11.2	7.2
Work	49	3	14	13	14	5
Education *(n=36)*						
High school diploma or equivalent	53.5	8.3	10.2	13.1	14.2	7.7
Some college credit, no degree	48.57	9.14	10.57	9.29	12.57	7
Trade/technical degree	66	18	7	15	16	10
Associates degree	52.67	10	10.67	11.67	13.33	7
Bachelor's degree	51.36	8.82	10.64	11	12.82	8.09
Master's degree	62.5	13.25	13.75	11.25	14	10.25
Average Annual Income *(n=35)*						
$20,000 - $39,999	45	9.5	4.5	11.5	14.5	5
$40,000 - $59,999	50	9	13	10	11	7
$60,000 - $79,999	64.25	12.13	10.88	15.5	15.38	10.38
$80,000 - $99,999	49.7	9.5	10.7	9.4	12.4	7.7
$100,000 +	51	8.71	11.21	10.57	13	7.5

Formative experiences in nature.

Respondents were asked to characterize how they spent their time in nature. This question was asked as previous researchers had indicated that how individuals spent time in nature during their youth can impact their ecological attitudes (Chawla, 1999; Duerden & Witt, 2010). This question had five possible answers: Leisure, Mostly Leisure, Roughly Equal Parts Work and Leisure, Mostly Work, and Work. Within this sample, 8%

characterized the time they spent in nature as Leisure, 31% characterized it as Mostly Leisure, 44% characterized it as Roughly Equal Parts Work and Leisure, 14% characterized as Mostly Work, and 3% characterized their time in nature Work.

The characterization of time spent in nature with the highest percentage of respondents with the highest quartile of NEP scores was Roughly Equal Parts Work and Leisure. Appendix F contains all of the characterizations and the NEP scores of the respondents that indicated that option displayed visually in pie charts.

NEP scores were compared to how respondents characterized the time they spent in nature during their youth. This was done by categorizing the respondents into the five options for time in nature characterizations then arranging the NEP scores in ascending value. Figure 10 is a bar graph for the respondents' NEP score split into each characterization for how the respondent spent their time in nature during their youth. characterization options. The bar graph widths are NEP scores and they are in increments of 10.

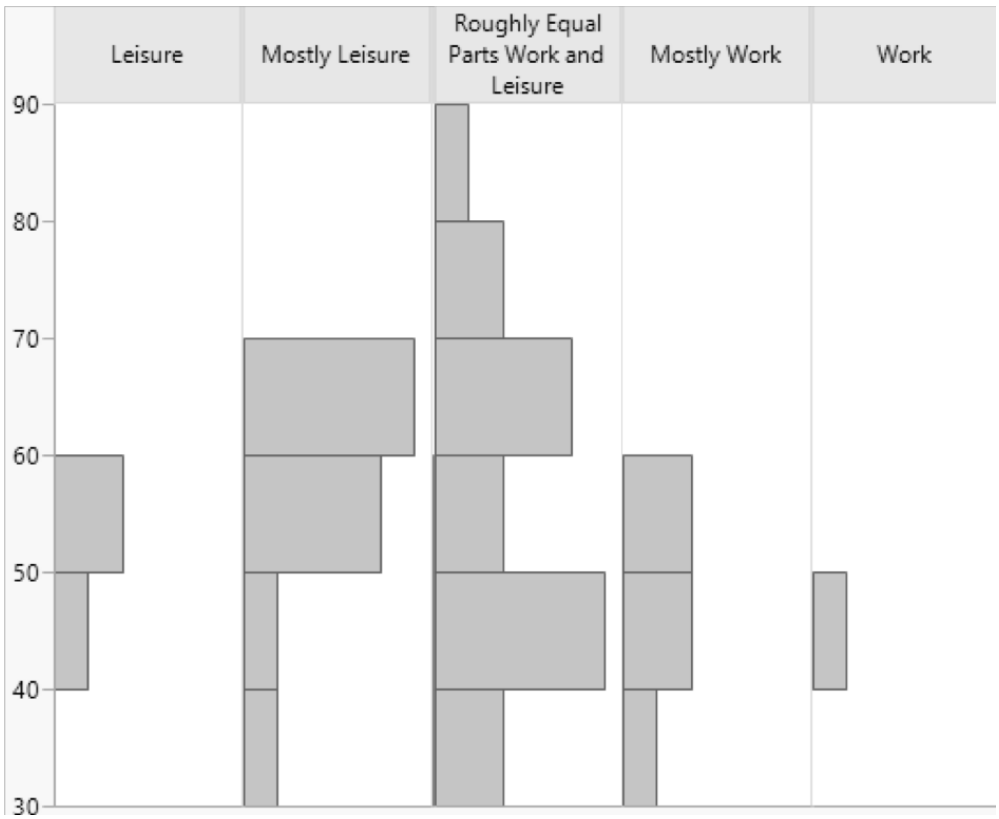

Figure 10. Respondents' NEP score categorized according to how they reported to have spent time in nature during their youth.

This variable was also looked at inversely so that instead of the NEP scores being the percentages of the time characterization, the time characterization were percentages of the NEP score quartile. When looked at this way, how individuals with the highest NEP scores spent their time in nature is clearer. Appendix K. contains all four of the pie charts showing the different NEP score quartiles and how the individuals earning that score spent their time in nature.

Highest attained education level.

For education, previous research has found that increased education correlates to a higher NEP score. This sample did not necessarily yield that as the education level with the highest NEP scores was in the “Master’s Degree” category, but the next highest was

the “Associates Degree” category. See Appendix G. for pie charts of all of the education levels with the percentages in NEP scores.

Average annual income.

In looking at the NEP scores compared to the respondent’s annual income, this sample also did not necessarily reflect what the literature has found. As discussed in the Literature Review of this thesis, as a person earns more money their pro-ecological attitudes tend to increase. Within the different annual income levels in this sample, the income level with the highest percentage scores between 62 – 86 was $60,000 - $79,999. Appendix D contains the pie charts for all annual income levels with percentages being NEP score quartiles.

Work in the logging industry.

The next independent variable examined is the respondent’s job compared to their NEP score. This variable was investigated partly to see if there were any correlations between income level and job and respondents’ scores. Appendix F. displays a table of the reported job of a respondent and whether they were coded as a “Logger” or a “Non-Logger.” After coding the jobs as Loggers and Non-Loggers, a multivariate analysis of jobs vs total NEP scores and NEP facets was conducted for loggers and non-loggers. The tables of the complete multivariate analysis, and the correlation probabilities, for loggers and non-loggers is below, Table 9. Cronbach’s alpha was also calculated for both job categories with loggers being 0.75 and alpha for non-loggers being 0.77.

Table 9. Multivariate of job vs NEP scores and NEP facets.

Multivariate Analysis, Loggers

Correlations

	NEP Score	Limits to Growth	Anti-anthro-pocentrism	Balance of Nature is Fragile	Reject of Exception-alism	Possibility of Eco-crisis
NEP Score	1.00	0.54	0.66	0.83	0.44	0.71
Limits to Growth	0.54	1.00	-0.04	0.26	0.07	0.25
Anti-anthropocentrism	0.66	-0.04	1.00	0.44	0.30	0.46
Balance of Nature is Fragile	0.83	0.26	0.44	1.00	0.29	0.70
Reject of Exceptionalism	0.44	0.07	0.30	0.29	1.00	-0.15
Possibility of Eco-crisis	0.71	0.25	0.46	0.70	-0.15	1.00

Correlation Probabilities

	NEP Score	Limits to Growth	Anti-anthropocentrism	Balance of Nature is Fragile	Reject of Exceptionalism	Possibility of Eco-crisis
NEP Score	0.00	0.03	0.01	0.0001	0.09	0.0019
Limits to Growth	0.03	0.00	0.88	0.33	0.79	0.35
Anti-anthropocentrism	0.01	0.88	0.00	0.09	0.26	0.08
Balance of Nature is Fragile	0.00	0.33	0.09	0.00	0.27	0.00
Reject of Exceptionalism	0.09	0.79	0.26	0.27	0.00	0.58
Possibility of Eco-crisis	0.00	0.35	0.08	0.0025	0.58	0.00

Multivariate Analysis, Non-Loggers

Correlations

	NEP Score	Limits to Growth	Anti-anthropocentrism	Balance of Nature is Fragile	Reject of Exceptionalism	Possibility of Eco-crisis
NEP Score	1.00	0.84	0.41	0.72	0.62	0.83
Limits to Growth	0.84	1.00	0.04	0.60	0.49	0.73
Anti-anthropocentrism	0.41	0.04	1.00	-0.08	0.24	0.19
Balance of Nature is Fragile	0.72	0.60	-0.08	1.00	0.32	0.63

Reject of Exceptionalism	0.62	0.49	0.24	0.32	1.00	0.25
Possibility of Eco-crisis	0.83	0.73	0.19	0.63	0.25	1.00

Correlation probability

	NEP Score	Limits to Growth	Anti-anthropocentrism	Balance of Nature is Fragile	Reject of Exceptionalism	Possibility of Eco-crisis
NEP Score	<.0001	<.0001	0.07	0.0003	0.00	<.0001
Limits to Growth	<.0001	<.0001	0.86	0.01	0.03	0.00030
Anti-anthropocentrism	0.07	0.86	<.0001	0.73	0.31	0.43
Balance of Nature is Fragile	0.00	0.01	0.73	<.0001	0.17	0.00
Reject of Exceptionalism	0.00	0.03	0.31	0.17	<.0001	0.30
Possibility of Eco-crisis	<.0001	0.00	0.43	0.00	0.30	<.0001

Notable correlations, correlations of 0.70 and higher, for loggers are between Balance of Nature and total NEP score, Possibility of Eco-Crisis and NEP Score, and Balance of Nature and Possibility of Eco-Crisis. The correlation values and their probabilities for those relationships are shown in Table 10.

Table 10. Logger multivariate analysis significant correlations and probabilities.

Relationships	Correlation	Correlation Probabilities
Balance of Nature vs NEP score	0.83	<0.001
Possibility of Eco-Crisis vs NEP Score	0.71	<0.01
Balance of Nature vs Possibility of Eco-Crisis	0.70	<0.01

Notable correlations, 0.70 and greater, for Non-Loggers are between total NEP score and Limits to Growth, total NEP vs Possibility of an Eco-Crisis, Limits to Growth and Possibility of an Eco-Crisis, and NEP and Balance of Nature. The correlation values and their associated probabilities for those relationships are shown in Table 11.

Table 11. Non-Logger multivariate analysis significant correlations and probabilities.

Relationships	Correlation	Correlation Probabilities
NEP vs Limits of Growth	0.84	<0.0001
NEP vs Possibility of an Eco-Crisis	0.83	<0.0001
Limits to Growth vs Possibility of Eco-Crisis	0.73	<0.001
NEP vs Balance of Nature	0.72	<0.001

Open-ended Response Options

There was one open-ended response option in the survey and an additional comment option after the survey. The open-ended response in the survey was asking respondents to re-call a significant memory in the nature. Both of these open-ended responses received many responses. Unfortunately, due to the time constraint for this thesis, those responses were not coded and analyzed. However, a comprehensive list of the responses and their associated NEP score is included in the appendices. For the list of responses to the significant memory in nature, see Appendix C. For the list of responses to the additional comment option after the survey, see Appendix D.

Chapter 5: Discussion

Parameters of the research.

The research was limited primarily by the number of responses. There were 42 responses and 36 were usable. For a survey to be usable, the respondent had to work in the logging industry and represent that they spent more than half of their working week in the woods. There were no further restrictions. Within the NEP Scale there were, however, the additional parameters of the five facets and the paradigm itself.

NEP Score Analysis as a Whole

This data found that individuals who work in the logging industry have an NEP score that is lower than a 2015 representative sample of WA residents. A study conducted by Steel, Pierce, Warner, and Lovrich looked at residents' environmental attitudes specifically around alternative energy in Washington and Oregon (2015). Their study involved a representative sample of 650 Washington residents and used the NEP scale to measure the respondents' environmental attitudes. Even though their study used the 6 item NEP scale, the NEP scale is designed so that means are comparable across all versions of the scale (Dunlap, Van Liere, Mertig, & Jones, 2000; Hawcroft, & Milfont, 2010). Because of this, the results of NEP analysis are comparable to the results of the NEP analysis of this study. To do so, the mean score along with one standard deviation above and below the mean were plotted in a box plot. The box plot was then positioned alongside the box and whisker plot for the NEP results of this study with the mean for each study clearly marked. By positioning the plots so that the y-axis showing the minimum and maximum possible points lining up, the two studies were then able to be compared visually. Figure 11 is the result of lining up the box plots for the 2015 study

and this study (Steel, Pierce, Warner, & Lovrich). The means for each study are marked by a black X on inside the blue boxes of the plots.

By having the two box plots and their means side by side, a visual comparison is possible. The comparison shows that the mean for this study is lower than the mean for the general population of Washington State. This indicates that the sample of individuals from the logging industry that responded to this survey have lower pro-ecological attitudes than does the sample of Washington residents from 2015 (Steel, Pierce, Warner, & Lovrich).

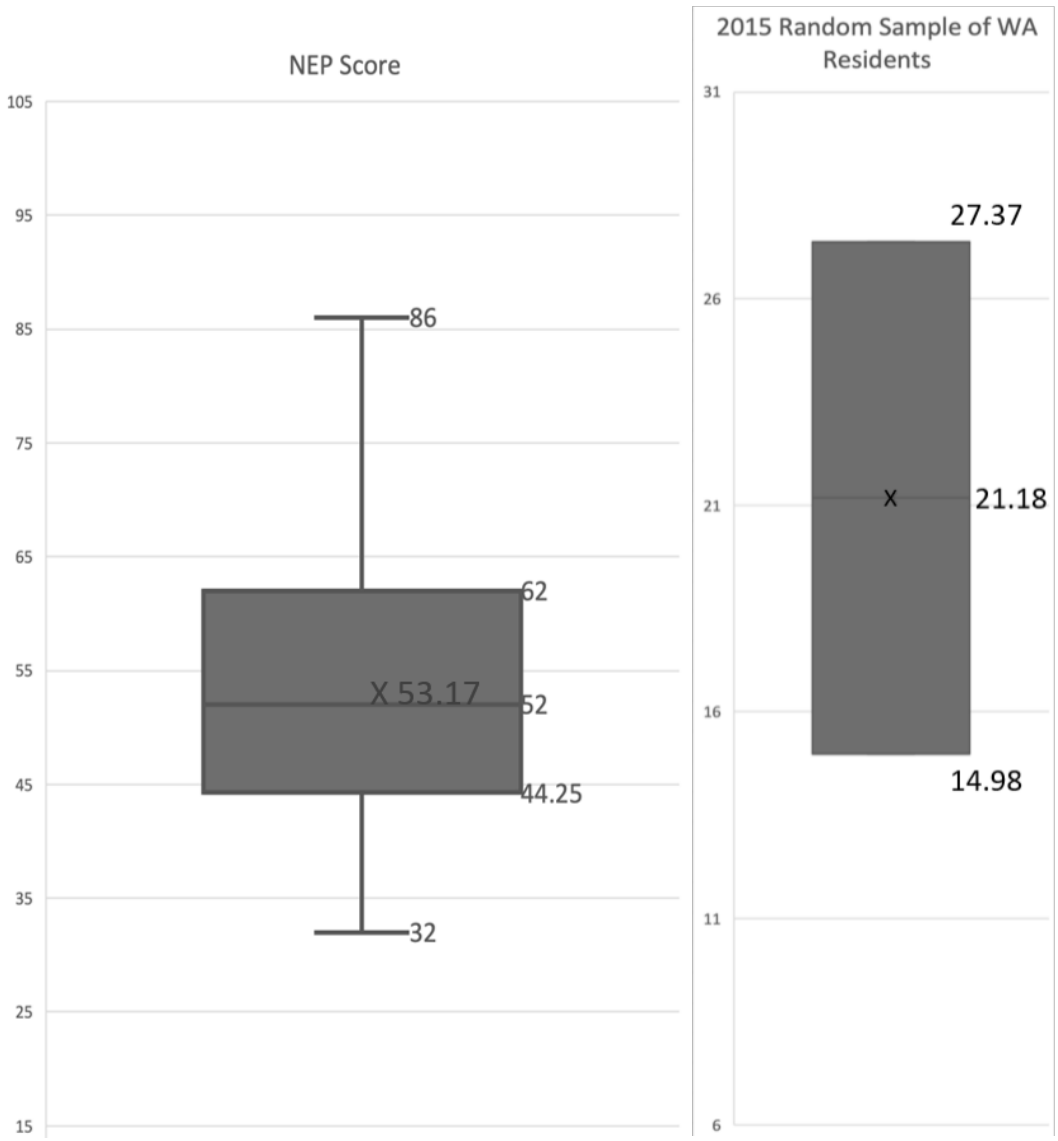

Figure 11. This study mean compared to study mean courtesy of Steel, B. S., Pierce, J. C., Warner, R. L., & Lovrich, N. P. (2015). Environmental value considerations in public attitudes about alternative energy development in Oregon and Washington. *Environmental Management*, *55*(3), 634–645. https://doi.org/10.1007/s00267-014-0419-3.

NEP Score Analysis by Item

This research found that within the parameters of the NEP Scale, the respondents in the sample demonstrated a median score of 52. The range of the scale in this research

is between 15 and 105 so the score of 52 indicates a median agreement of 41.11% with the NEP items.

The NEP Scale results from this study could then be compared to the NEP results from the Dunlap et al. 2000 article detailing the updated version of the NEP Scale. For that article, researchers surveyed residents in Washington state to assess their ecological attitudes. They took a representative sample of Washington residents and the number of respondents on each item varied from 661 to 668. They used a 5 point likert scale for respondents to identify their level of agreement – strongly agree, mildly agree, unsure, mildly disagree, and strongly disagree. Their responses are represented in

Table 12.

Table 12. Representative sample of Washington residents.
Credit for the table: Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues*, *56*(3), 425–442

Do you agree or disagree[b] that:	SA[c]	MA	U	MD	SD	(*N*)
1. We are approaching the limit of the number of people the earth can support	27.7%	25.2%	21.0%	16.0%	10.0%	(667)
2. Humans have the right to modify the natural environment to suit their needs	4.1	28.5	9.2	33.9	24.3	(663)
3. When humans interfere with nature it often produces disastrous consequences	44.6	37.6	4.0	11.2	2.5	(668)
4. Human ingenuity will insure that we do NOT make the earth unlivable	7.8	23.5	21.5	24.4	22.7	(664)
5. Humans are severely abusing the environment	51.3	35.3	2.6	9.3	1.5	(665)
6. The earth has plenty of natural resources if we just learn how to develop them	24.4	34.8	11.3	17.5	11.9	(663)
7. Plants and animals have as much right as humans to exist	44.7	32.2	4.7	12.8	5.7	(665)
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations	1.1	7.4	11.3	30.9	49.4	(664)
9. Despite our special abilities humans are still subject to the laws of nature	59.6	31.3	5.4	2.9	0.8	(664)
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated	3.9	17.9	13.8	25.9	38.5	(665)
11. The earth is like a spaceship with very limited room and resources	38.0	36.3	7.5	13.4	4.8	(664)
12. Humans were meant to rule over the rest of nature	13.5	20.4	8.2	23.9	34.0	(661)
13. The balance of nature is very delicate and easily upset	45.9	32.8	5.9	14.1	1.4	(665)
14. Humans will eventually learn enough about how nature works to be able to control it	3.2	20.1	24.2	27.9	24.6	(666)
15. If things continue on their present course, we will soon experience a major ecological catastrophe	34.3	31.0	16.9	14.1	3.6	(667)

Looking at the scores from the Dunlap et al. paper and the scores from this research showed that while not the reciprocal, the results to this study did not follow the same

trends. Additionally, a true comparison of the results was not possible as this research used a 7-point scale whereas Dunlap et al. used a 5 point scale. Even though the two scales were different, it is still meaningful to look at how the samples compared. This was done by looking at the highest percentages of responses for both Dunlap et al. study and the results of this study.

Item 1.

For item 1, Dunlap et al. found the highest percentage in the Strongly Agree category indicating a pro-ecological attitude. Whereas the results from this sample found the highest percentages were in both the Strongly Disagree and Unsure categories indicated not a pro-ecological attitude.

Item 2.

On item 2, the highest percentage in the Dunlap et al. study was in the Mildly Disagree category indicating a pro-ecological attitude. The second highest percentage was in the Mildly Agree category indicating the sample wasn't in complete agreement for this option. Whereas in this study, the highest percentage for item 2 was tied between Mildly Agree and Agree indicated not a pro-ecological attitude. There does appear, then, to be some overlap in agreement of this item between the Dunlap et al. sample and the sample for this study.

Item 3.

Dunlap et al. found the highest percentage on item 3 in the Strongly Agree category indicating a pro-ecological attitude. Whereas, this study found the highest percentage on item 3 tied between Disagree and Mildly Disagree indicating not a pro-ecological attitude.

Item 4.

On item 4, Dunlap et al. found the highest percentage in the Mildly Disagree category indicating a pro-ecological attitude. However, categories Mildly Agree, Unsure, Mildly Disagree, and Strongly Disagree all had percentages between 21 and 25. This study found the highest percentages on item 4 tied between Mildly Agree and Agree indicating not a pro-ecological attitude.

Item 5.

Dunlap et al. found the highest percentage on item 5 in the Strongly Agree category indicating a pro-ecological attitude. This study found the highest percentage in the Disagree category indicating not a pro-ecological attitude.

Item 6.

For item 6, Dunlap et al. found the highest percentage in the Mildly Agree category indicating a pro-ecological attitude. This study also had the highest percentage of responses in the Mildly Agree category with 30.56% of the sample selecting Mildly Agree. Additionally in item 6, respondents indicated agreement with the statement further in that 27.78% chose the Agree option and 25% selected Strongly Agree. These results indicate a pro-ecological attitude.

Item 7.

For this item, Dunlap et al. found the highest percentage in the Strongly Agree category indicating a pro-ecological attitude. This study found the highest percentage in the Mildly Disagree category indicating a not pro-ecological attitude.

Item 8.

Dunlap et al. found the highest percentage for item 8 in the Strongly Disagree category indicating a pro-ecological attitude. This study found the highest percentage of responses in the Mildly Disagree category indicating a pro-ecological attitude.

Item 9.

On this item, Dunlap et al. found 59.6% of respondents indicated that they Strongly Agree with the statement indicating a pro-ecological attitude. This study also had the highest percent of responses in the Strongly Agree category also indicating a pro-ecological attitude. Additionally, on this item respondents had an average score of 6 and a median score of 6 out of 7. This item had the highest average and median scores out of all of the items on the NEP scale.

Item 10.

Dunlap et el. Found the highest number of respondents selected the Strongly Disagree option for this statement indicating a pro-ecological attitude. Whereas this study had the same percentage of respondents fall into the Mildly Agree and Strongly Agree categories indicating not a pro-ecological attitude.

Item 11.

In this item, Dunlap et al. found the highest percentage of respondents, 38%, in the Strongly Agree category. The second highest percentage was less than 2 percentage points smaller – with 36.3% of the respondents selecting the Mildly Agree category. Both indicate a pro-ecological attitude. This study found the highest percent of respondents in the Disagree category indicating a not pro-ecological attitude.

Item 12.

Dunlap et al. found the highest percentage of respondents in the Strongly Disagree category indicating a pro-ecological attitude. For this study, this item's statement agreement was unclear. The highest percentage for this item was 16.67% and was the percentage for four of the seven possible categories – Disagree, Mildly Disagree, Mildly Agree, and Agree. For this item the other three categories' percentages were 8.33% in Strongly Disagree, 11.11% in Unsure, and 13.89% in Strongly Agree. As for whether or not this statement's responses indicate a pro-ecological attitude or not – the results are inconclusive.

Item 13.

On item 13, the highest percentage of respondents in the Dunlap et al. paper denoted that they Strongly Agreed with the statement. This indicates a pro-ecological attitude. Whereas this study found the highest percent of respondents chose the Disagree category indicating a not pro-ecological attitude.

Item 14.

Dunlap et al. found the highest percentage of respondents, 27.9% in the Mildly Disagree category indicating a pro-ecological attitude. But they also found similar percentages in the Unsure and Strongly Disagree categories - 24.2% and 24.6%, respectively. This study found similar results to the statement presented in item 14. There was a tie for the highest percentage, 22.22%, in the Mildly Disagree and Unsure categories with the second highest percentage, 19.44% in the Disagree category. These results indicate a pro-ecological attitude.

Item 15.

Dunlap et al. found the highest percentages for the statement in item 15 in the Strongly Agree and Agree categories - 34.3% and 31%, respectively. These results indicate a pro-ecological attitude. Whereas this study found the highest percentage for item 15 to be in the Disagree category indicating not a pro-ecological attitude.

Continued Limitation of the NEP Scale

The wording of the NEP scale has been previously identified as problematic to getting the most representative data (Dunlap, Van Liere, Mertig, & Jones, 2000; Hawcroft, & Milfont, 2010). During this study, the language and wording of the scale was identified as problematic by one of the respondents who wrote:

Your questions, depending on which view you're asking from, can be answered as a "1" from one view or a "7" from the other. Ie-the "ecological crisis" from my view is the lack of mgt. & current state of forests & loss of complete landscapes from wildfire, but "ecological crisis" has a very different meaning to the general public. I recommend a change in wording of questions that are more specific to loggers & have a more direct definition. These questions are worded such that, me being a graduate forester & logger, don't know exactly what I'm disagreeing or agreeing with.

This respondent identified the wording as an issue that made it difficult for them to know how to answer the question. He drew special attention to the connotations of individual words and how different sub-populations of people would respond differently because the word carries different meaning for them.

Lack of Stewardship in the NEP

The NEP scale does not take into consideration stewardship mindsets when measuring for a pro-ecological attitude. People who work in the logging industry believe themselves stewards and caretakers of our forests in that they work to prevent wildfires, keep wildlife migration paths clear and usable, and the work they do in forests helps to keep our waterways clean. The industry has been molded around sustainability, re-growth and new-growth, and ensuring forests will be around for generations to come. The people that work in the logging industry are emphatic supporters of protection and responsible management of nature and the environment. The NEP scale does not look favorably upon this type of pro-ecological behavior for 2 reasons. First, the NEP is very clear that humans are not the superior species. Second, within the NEP nature is fragile and not resilient or able to regrow, replenish, and renew itself.

Being a steward involves recognizing one's superiority and influence and choosing how to apply those agencies. A successful steward manages respectfully and responsibly taking into consideration their individual impact – longitudinally and spatially. In this sense, the logging industry must consider the impact and the best way to ensure longevity of the resource while also ensuring that spatially, their influence is contained and careful. Simply, longevity is ensured when an area is replanted. "When one is logged, plant three more" is a slogan of sorts for the logging industry and the expanse of tree replanting services required is proof of this slogan (WA Department of Natural Resources, 2019; Trobaugh, 2012). Spatial influence is contained by the restrictions of an area that can be logged or harvested. The logging industry respects the restrictions of timber sales because they know that ensuring productive harvests means leaving stands of

trees for decades before touching them. The logging industry recognizes their ability and agency over our forests and takes great care to watch re-growth, track species movement, and conserve forest economic and recreational viability.

Another reason why stewardship is biased against in the NEP is because nature is exclusively viewed as fragile within the NEP. This idea of nature leaves little room for its true resiliency. In the Pacific Northwest we've seen nature recover from wildfires, volcanic eruptions, earthquakes, and floods. Resiliency is ingrained in nature and affects how we interact with nature. For the logging community, this resiliency and ability to recover is a part of nature that they observe in their daily lives. The idea that nature is fragile and should be left alone can even be harmful to forests especially when considering wildfires. The contested old-growth forests are an interesting area to consider when thinking about stewardship of nature in the context of wildfires. As covered throughout this thesis, logging in old-growth forests was suspended in 1991. In recent years Jerry Franklin, one of the lead forest scientists behind the ban of logging in old-growth forests, has come forward drawing attention to a need for some logging in old-growth forests as a way to mitigate the growing occurrence of wildfires in those forests (Cornwall, 2017). Mitigating wildfires is a key element to the stewardship performed by the logging industry and one that they've been claiming for decades. The NEP excludes the idea that nature is resilient and thinks of it only as a fragile entity that humans should exert little to no control over and this ideal biases against anyone who believes in conservation ideals or land stewardship.

Chapter 6: Conclusion

This sample represented the stewardship mindset held by the industry. Every conversation, observation, and written response from participants and interested parties within the logging industry presented their deep love for nature and the environment. The people who work in the logging industry harness this love to be stewards of our environment choosing to spend their working days in nature carefully managing many different types of eco-systems. This group presents strong pro-ecological attitudes clearly visible by their ardent support for responsible management of forests, watersheds, species bio-diversity, and natural resources.

The NEP Scale is not an effective tool for measuring the pro-ecological attitudes of people who work in the logging industry. This is because that population believes in being stewards and the NEP is biased against stewardship minded individuals. Furthermore, the NEP itself excludes stewardship. With the NEP Scale being the most widely used scale to measure ecological attitudes, it's exclusionary nature will yield untrue results when measuring those attitudes. Ecological attitude research cannot continue using a scale that excludes whole populations of people that present both strong pro-ecological attitudes and a very valid way of interacting with nature.

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Appendices

Appendix A.

The survey

1) The following table contains statements about environmental attitudes. Please read the statement and put a check in the box that best describes your perspective. To indicate your level of agreement, check the best-fitting box (Strongly Disagree=1; Disagree=2; Mildly Disagree=3; Unsure=4; Mildly Agree=5; Agree=6; and Strongly Agree=7).

Statement	1	2	3	4	5	6	7
We are approaching the limit of the number of people the earth can support.							
Humans have the right to modify the natural environment to suit their needs.							
When humans interfere with nature it often produces disastrous consequences.							
Human ingenuity will ensure that we do NOT make the earth unlivable.							
Humans are severely abusing the environment.							
The earth has plenty of natural resources if we just learn how to develop them.							
Plants and animals have as much right as humans to exist.							
The balance of nature is strong enough to cope with the impacts of modern industrial nations.							
Despite our special abilities humans are still subject to the laws of nature.							
The so-called 'ecological crisis' facing humankind has been greatly exaggerated.							
The earth is like a spaceship with very limited room and resources.							
Humans were meant to rule over the rest of nature.							
The balance of nature is very delicate and easily upset.							
Humans will eventually learn enough about how nature works to be able to control it.							
If things continue on their present course, we will soon experience a major ecological catastrophe.							

Work related questions

2) What is your job in the timber industry? _____

3) How many years have you been in the timber industry? _____

Youth Questions

4) Did you spend a lot of time in nature during your youth? □Yes □Somewhat □No

5) If so, how would you characterize the type of actions you did most in nature during your youth?

□ Work □ Mostly work □ Roughly equal parts work and leisure □ Mostly leisure □ Leisure

6) Do you have any significant memories of nature during your childhood?

□ Yes □ No □ No opinion
If so, please describe:

Demographic questions

The following are basic demographic questions.

7) Where did you grow up?

City_____ State_____ Zip_____

8) Where do you live now?

City_____ State_____ Zip_____

9) What is your age? _____

10) What is your gender? _____

11) Which of the following best describes your race?

□ African American/ Black □ American Indian/ Alaska Native □ Asian □ Native Hawaiian/ Other Pacific Islander □ White/ Caucasian

□ Other _____ □ Prefer not to answer

12) What's the highest level of education you completed?

□ Some high school, no diploma □ High school graduate, diploma or the equivalent (e.g. GED) □ Some college credit, no degree □ Trade/ technical/ vocational training □ Associate degree

□ Bachelor's degree □ Master's degree □ Professional degree (e.g. Juris Doctor, Doctor of Medicine, Doctor of Education, Doctor of Pharmacy) □ Doctorate degree

13) How many children do you have? _____

14) What is your average, individual, yearly income? (please circle)

$0 - $19,999	$20,000 - $39,999	$40,000 - $59,999	$60,000 - $79,999	$80,000 - $99,999	$100,00 +

Appendix B.

Certification process from the Washington Contract Loggers Association.

Guidelines (Credit: Washington Contract Loggers Association, Inc. | Master Logger Program. (n.d.). Retrieved May 16, 2019, from http://loggers.com/master-logger-program/)

Program overview – The Master Logger Program (MLP) is a voluntary education program that accredits individuals and the company they represent. The MLP was designed to further educate loggers and other harvest related businesses about sustainable forestry, safety, forest practices, business management and forest management. Through continuing education, loggers and others are committing to advancing professionalism for themselves and the industry. The MLP program is targeted to reach business owners, foremen and supervisors. However, anyone is welcome to attend.

The course curriculum includes thirty-two hours (4 days) of training in the following areas:

Forest silviculture and ecology (8 hours)

Logging safety and worker's compensation loss control (8 hours)

Washington Forest Practices Act rules and regulations (8 hours)

Logging business management (8 hours)

In addition, each participant must also have a valid first aid card that includes CPR training. First aid training is not offered as part of the curriculum. The participant is not required to have a valid first aid card to register for the program.

The MLP program was developed by Washington Contract Loggers Association, Inc., in cooperation with principles in the timber industry, Washington State Department of Natural Resources, Washington State University Cooperative Extension, Washington Farm Forestry Association and the Washington Department of Labor and Industries.

Sustainable Forestry Initiative (SFI) – The Master Logger Program exceeds the logger training requirements in SFI. The program has been reviewed and accepted by the Washington State SFI Implementation Committee.

Master Logger – An individual who completes the MLP course curriculum, holds a valid first aid card and pays required course registration fees as follows: $140 for WCLA, Inc. members; $480 for non-members. In addition, non-WCLA, Inc. members will be required to pay a service fee of $175 per year ($100 per year for tree farmers). To maintain MLP certified status, continuing education is required.

Continuing education – To maintain MLP status, each participant is required to earn at least 8 credit hours of continuing education prior to the expiration of the initial two-year accreditation period and at least 8 credit hours every year thereafter.

The participant can earn and be given credit for more than 8 hours a year. Their accreditation expiration date will be forwarded one calendar year for each 8 hours of continuing education completed.

Continuing education prior to completing MLP requirements will not be accepted.

A continuing education form is mailed to each MLP participant. The form lists several opportunities. Credits may be given for training, seminars or conferences that offer education and training that resembles the MLP curriculum.

One credit hour is given for each hour of approved continuing education. For example, a 4-hour seminar would be worth 4 hours of continuing education.

In order for credit to be given for a class the participant needs to submit proof of attendance. They should submit a copy of a registration form, agenda, dates and hours of training.

Participants can attend future MLP session(s) for continuing education credits.

Expiration/reinstatement of MLP status – The Master Logger Program graduate remains in good standing until he/she fails to meet continuing education requirements or is sanctioned for conduct that discredits the Master Logger Program. Additionally, non-WCLA, Inc. members will be deactivated if the non-member service fee is not paid.

To be reinstated for lack of continuing education, the MLP graduate must complete all delinquent credits from previous years. For example, if a person's accreditation expired on December 31, 2017 and no continuing education had been completed since then, the person would have to complete 16 hours to be current through December 31, 2019.

Once an individual's certification is expired by two or more years, they will be contacted, and encouraged once again to submit continuing education credits. If no response is received, the certification will be deactivated until further notice.

Record Keeping – The WCLA, Inc. shall maintain all records and administer the Master Logger Program. All MLP graduates shall be listed on the WCLA, Inc. website unless they specifically ask not to be. This list is regularly updated. In addition, for more complete information, including addresses, phones, continuing education status, companies and individuals may contact Tami Au at (800) 422-0074 Ext. 103 or email tami@loggers.com.

Continuing Education forms are available at the WCLA, Inc. and the record of continuing education will be maintained by WCLA, Inc. staff. It shall be the responsibility of the MLP graduate to submit those approved courses completed to our office for recording.

Company recognition – MLP accreditation is given to the company whose owner or representative(s) completes the mandatory training. In the event an MLP employee leaves employment with the accredited company, accreditation is transferable to another company provided the representative's accreditation is current.

For a company to remain accredited, it must employ at least one MLP graduate who has maintained current accreditation. In the event a company no longer employs an MLP graduate, that company must sponsor a new representative at the next scheduled MLP training in their region.

Onsite Supervisor: An individual who is directly supervised by an individual that is a current Master Logger Professional. The Onsite Supervisor will be required to complete the DNR Forest Practices class of the WCLA Master Logger Program, plus submit a current first aid/cpr card, to achieve Onsite Supervisor certification status. To maintain Onsite Supervisor status, at least four (4) hours of continuing education is required in each subsequent year.

Reciprocity with other states – A person who has completed a similar logger training program in another state will be given credit for that training and WCLA, Inc. will waive the requirements to attend the Silviculture/Ecology and Logging Business Management training sessions. Sessions on Workers Compensation/Safety and the Forest Practices Act (DNR) must be completed, and a current first aid card must be submitted for accreditation.

The person must submit proof that he/she has completed a logger training program in another state.

Special consideration for small private tree farm owners – Because these individuals only harvest on their privately owned timberland they are eligible for the Master Logger Program – Tree Farmer designation. The training requirements include attending the silviculture/ecology session and forest practices rules and regulations training. They must also have a valid first aid card.

Continuing education requirements also apply, as well as a $100 non-member service fee.

Information – WCLA, Inc. staff are available for information, assistance, consultation or whatever need may arise. If we do not have the expertise on staff, we have the ability to find that information for you.

Sanctions for unprofessional conduct – Unprofessional conduct by a MLP company such as blatant and repeated forest practice violations may lead to a sanctions review by the WCLA, Inc. Board of Directors. The Board will decide appropriate action, up to and including termination of the company's Master Logger status.

Appendix C.

Full open ended responses and associated NEP scores

NEP	Significant memories of nature
32	Animals
34	hiking and camping with my father in the cascade mountains, go swimming
39	Working to harvest/log big timber WA & AL; hunting; fishing; hiking
40	campling and hiking in my 20s
41	Hunting, fishing, waterskiing, dirtbiking, cutting firewood, farming
42	I went on my first backpacking trip when I was 9 with my father (owns timber co.) + Grandpa (Retired frester)
42	boy scouts, hiking, fishing, biking
44	hunting, fishing, waterskiing, dirtbiking, cutting firewood, farming
45	saw logging destroy fish habitat ([Beckler/Reckler River]) begore there were forest practices laws (mid 60's)
46	Fishing and huntering
47	hiking, fishing, working on farm
48	camping + hiking as an Eagle Scout
49	working the woods; old way; 80 year old tree approximately 24 " new brand of trees can be 24" in 40 years
50	Getting up early going to work with my dad and see the sunrise in the mountains was awesome and still is today.
51	backpacking with boy scouts; camping; hiking; fishing
52	hunting, fishing, horseback riding, and hiking
52	Family cabin on Saulk River, Darrington
53	Fishing in the ocean with my dad.
60	camping + fishing
62	Beauty of wild areas & parks. However, logging and clearcuts seemed normal also.
62	Even as a young child we were allowed to spend entire days just playing inn the woods with no adult supervision
62	farming, camping, beaches
62	hiking and fishing
63	virtually no dead standing trees because forests were managed
64	workng forests changed over time, wildlife remained abundant
65	Helping Dad with Rock Pit, land development, Tree planting in high school. Camping, fishing, hunting, wood cutting
70	Being in an old growth forest and marveling at the size and beauty of the trees and the blanket of moss on the ground
79	The first time I saw a clear-cut harvest on a hike in the Olympic National Forest and it up-set me until an adult explained it to me.

86 Hiking + Camping

Appendix D.

Full responses to Additional Information to Share at end of survey and associated NEP Scores.

NEP score	Any other information to share
34	I am a great lover of the outdoors and respect nature. I prefer to spend as much time as I can enjoying the outdoors with my children.
37	Most loggers & others in the Forestry Industry understand our forests are our livelyhood & work to make them better. We know management is better than no management when it comes to fire prevention & limitation. Wildfire is not good for water, wildlife, & carbon release.
39	Biggest problems are in underdeveloped countries with little regulation. China & Russia too. In U.S. cities of reg. to protect environment. Canada Europe
40	I have spent my life working + playing [in] the woods. I enjoy watching + surrounding myself in the beauty of nature. I hunt, fish, hike and hate zoo's. This Earth was designed to heal itself with smart management of our renewable resources such as timber, fish, wildlife we will nnever run out.
41	Wildfires are destroying the environment, not logger. Wildfires are largely caused by environmentalists shutting down the management of nature. (spotted owl?) Loggers depend on a healthy environment to work and play. Liberals have passed tree hugging laws preventing proper management of the forest devistating our environment and economy.
42	My father has owned a timber company since I was born. I have been around logging for 29 years and have worked in the woods professionally for 5 years. I have spent most of my life doing things outside and in nature. I have a love for the forest, trees, and nature. Most of my free timef is spent in the woods or mountains in one way or another.
42	I have planted trees. I am an American Tree Farm System Inspector. I have been an Assistant Boy Scoutmaster.
45	Radical environmentalist are creating more problems than they are "helping" to solve. Unnecessary and uneeded lawsuits are deflecting & expensively costing prudent forestry practices from solving issues of forest health and corrective management of resources
47	I am a logger and have been for over 50 years - forests are a wonderful cycle of nature and are here to provide for us forever. They are a truly great resource factory that has far reaching potential.
48	In my experience, the biggest environmentalists are people involved in the timber industry. Loggers spend most their time in the woods. We watch trees get cut down, then grow again. I feel most loggers notice the need for old growth forests and industrial forests. Industrial forest areas or tracts that have been logged before. They tend to have more wildlife & new growth. Logged

tracts mimics the large amounts of land that burned before humans ever got involved in logging. Logging our renewable resource is a great alternative to large fires. Old growth forests have an entirely different eco system. They are darker, dead trees, larger trees that choke out any new growth. Which is great for certain species. The worst type of land is an industrial forest that is not maintained. The Federal government is the worst copulate. Past generations have built logging roads, rail grades & altered stream flows. This causes landslides & alters animal habitat. The solution is to maintain a hands off approach to our old growth forests. We need to use logging as an alternative to forest fires that emit large amounts of pollution into our air & destroy fish habitat. We need to maintain our unmaintained industrial forest. Protect streams by maintaining our forest roads. The forest land needs multi-generational tracts for all species to thrive. The benefits are, revenue for school & hospitals through the timber tax, benefits to the economy, the ability to tie conservation projects in with logging operations, decrease the need for non-renewable building products, better habitat for all species, increase recreation opportunity & easier access to teach our next generation of environmental stewards. Past generations have done the best they could with the science at the time. We must always maintain what we have done and improve as we go forward.

49 There is always 2 sides to every story.
I believe most Americans are un-educated about the Timber Industry. They do not know it's a renewable resource and the jobs it creates. Loggers are the Best Hardworking people anyone could meet. They do care about the
50 environment! If they didn't they wouldn't have jobs!
The assumption of some that either recreation exists or working forests is a false one. We can have both. Without a doubt, logging changes the landscape, but, when done right, does not alter the land, or water coming from the land. Wood is the most environmentally friendly building material. It is also the only building material that is renewable. Other building products (steel, brick, concrete) require extractive mining & cannot be replanted. Logging is not a hobby, or just something to do to the land. It is done to provide products for the benefits of our society. If we do not want to provide wood products for consumption by Americans, where should the products come from? In the U.S. we have some of the most productive land in the world, some of the strictest environmental regulations pertaining to harvesting, and some of the
51 best land managers.
There has to be a balance between human giving needs and not destroying nature. If managed correctly it can be done. Like managing forest in 40-60
53 year rotations. Minimalizing impact on nature as best possible.
I've worked in the forest products industry for 32 years with "various" titles. I've been on fire crews, planted trees, worked on survey crews, designed and permitted harvest units, log quality control supervisor, marketing logs, and
58 currently buying logs. I've worked with multiple logging companies and

individuals. I grew up in the outdoors and have too many "significant memories" to write.

Born & raised in a logging family. Except for 3 years of Army duty I have been in and around the industry my entire life. I received my sense of stewardship from my father who was a proud man and he understood the meaning of
60 stewardship.

Most loggers have a love of forest environments; otherwise they would not choose to spend every day of their working lives there. They also understand that our Northwest forests are very resilient, on a sustainable basis. We feel most "enlightened" young people have preconceived notions and do not want
62 to bother to come to the woods for an unbiased education.

62 I am a 4th generation logger.

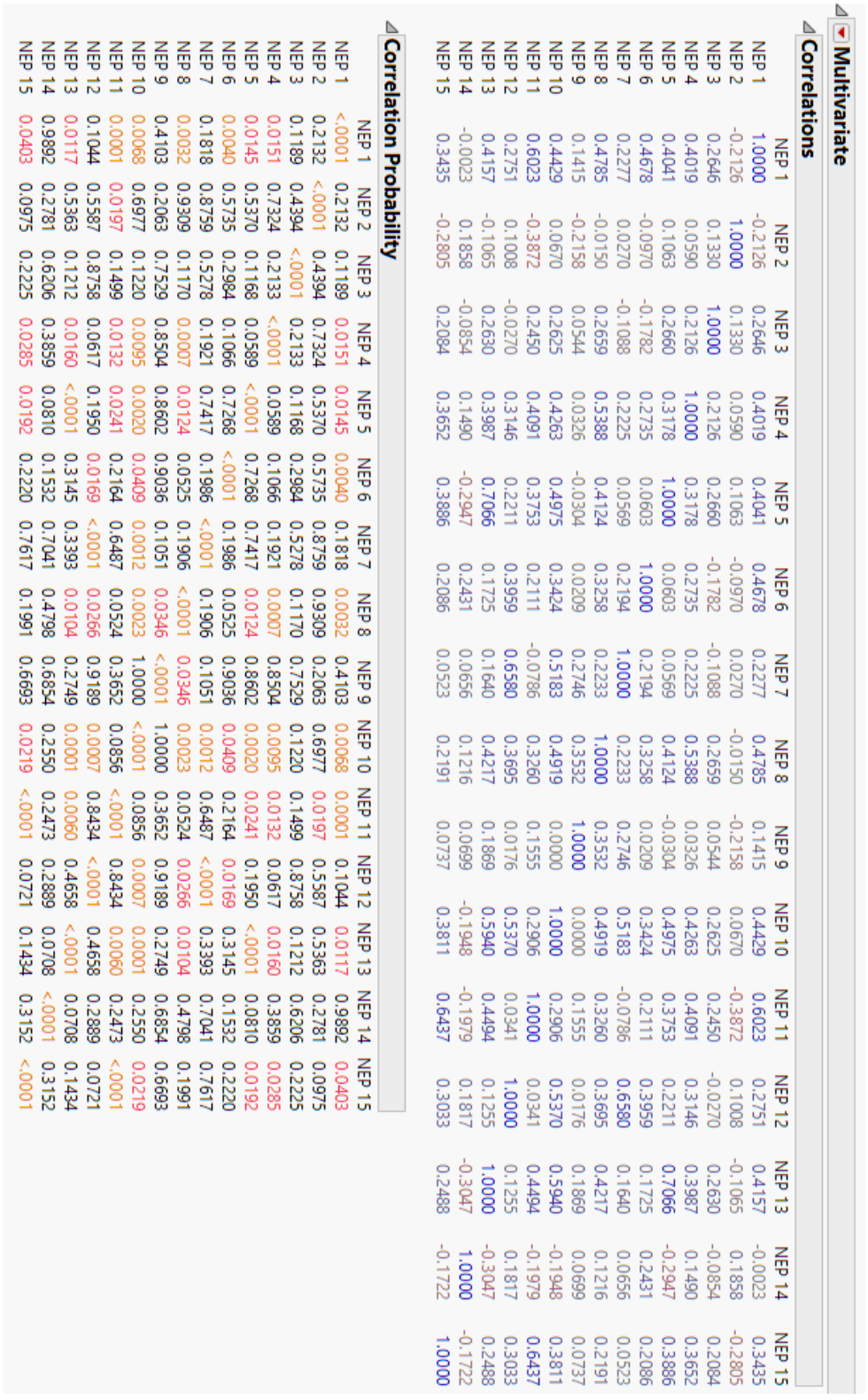
your questions, depending on which view you're asking from, can be answered as a "1" from one view or a "7" from the other. Ie-the "ecological crisis" from my view is the lack of mgt. & current state of forests & loss of complete landscapes from wildfire, but "ecological crisis" has a very different meaning to the general public. I recommend a change in wording of questions that are more specific to loggers & have a more direct definition. These questions are worded such that, me being a graduate forester & logger, don't know exactly
63 what I'm disagreeing or agreeing with.

I feel as a logger we are stewards of the land. I take great pride in my work, not only do we benefit from the natural resources but its our responsibility to
70 reforest to ensure for generations to come can do the same.

As humans we are part of the environment. It is our responsibility to practice good conservation to protect and improve our natural resources and benefit society and the environment, now and in the future. When we cut a tree,
79 plant two.

Appendix E.

Multivariate NEP Scores



Multivariate

Correlations

	NEP 1	NEP 2	NEP 3	NEP 4	NEP 5	NEP 6	NEP 7	NEP 8	NEP 9	NEP 10	NEP 11	NEP 12	NEP 13	NEP 14	NEP 15
NEP 1	1.0000	-0.2126	0.2646	0.4019	0.4041	0.4678	0.2277	0.4785	0.1415	0.4429	0.6023	0.2751	0.4157	-0.0023	0.3435
NEP 2	-0.2126	1.0000	0.1330	0.0590	0.1063	-0.0970	0.0270	-0.0150	-0.2158	0.0670	-0.3872	0.1008	-0.1065	0.1858	-0.2805
NEP 3	0.2646	0.1330	1.0000	0.2126	0.2660	0.1063	-0.1782	-0.1088	0.2659	0.0544	0.2625	0.2450	-0.0270	0.2630	-0.0854	0.2084
NEP 4	0.4019	0.0590	0.2126	1.0000	0.3178	0.2660	0.2735	0.2225	0.5388	0.0326	0.4263	0.4091	0.3146	0.3987	0.1490	0.3652
NEP 5	0.4041	0.1063	0.2660	0.3178	1.0000	0.0603	0.0603	0.0569	0.4124	-0.0304	0.4975	0.3753	0.2211	0.7066	-0.2947	0.3886
NEP 6	0.4678	-0.0970	-0.1782	0.2735	0.0603	1.0000	0.2194	0.3258	0.0209	0.3424	0.2111	0.3959	0.1725	0.2431	0.2086
NEP 7	0.2277	0.0270	-0.1088	0.2225	0.0569	0.2194	1.0000	0.2233	0.2746	0.5183	-0.0786	0.6580	0.1640	0.0656	0.0523
NEP 8	0.4785	-0.0150	0.2659	0.5388	0.4124	0.3258	0.2233	1.0000	0.3532	0.4919	0.3260	0.3695	0.4217	0.1216	0.2191
NEP 9	0.1415	-0.2158	0.0544	0.0326	-0.0304	0.0209	0.2746	0.3532	1.0000	0.0000	0.1555	0.0176	0.1869	0.0699	0.0737
NEP 10	0.4429	0.0670	0.2625	0.4263	0.4975	0.3424	0.5183	0.4919	0.0000	1.0000	0.2906	0.5370	0.5940	-0.1948	0.3811
NEP 11	0.6023	-0.3872	0.2450	0.4091	0.3753	0.2111	-0.0786	0.3260	0.1555	0.2906	1.0000	0.0341	0.4494	-0.1979	0.6437
NEP 12	0.2751	0.1008	-0.0270	0.3146	0.2211	0.3959	0.6580	0.3695	0.0176	0.5370	0.0341	1.0000	0.1255	0.1817	0.3033
NEP 13	0.4157	-0.1065	0.2630	0.3987	0.7066	0.1725	0.1640	0.4217	0.1869	0.5940	0.4494	0.1255	1.0000	-0.3047	0.2488
NEP 14	-0.0023	0.1858	-0.0854	0.1490	-0.2947	0.2431	0.0656	0.1216	0.0699	-0.1948	-0.1979	0.1817	-0.3047	1.0000	-0.1722
NEP 15	0.3435	-0.2805	0.2084	0.3652	0.3886	0.2086	0.0523	0.2191	0.0737	0.3811	0.6437	0.3033	0.2488	-0.1722	1.0000

Correlation Probability

	NEP 1	NEP 2	NEP 3	NEP 4	NEP 5	NEP 6	NEP 7	NEP 8	NEP 9	NEP 10	NEP 11	NEP 12	NEP 13	NEP 14	NEP 15
NEP 1	<.0001	0.2132	0.1189	0.0151	0.0145	0.0040	0.1818	0.0032	0.4103	0.0068	0.0001	0.1044	0.0117	0.9892	0.0403
NEP 2	0.2132	<.0001	0.4394	0.7324	0.5370	0.5735	0.8759	0.9309	0.2063	0.6977	0.0197	0.5587	0.5363	0.2781	0.0975
NEP 3	0.1189	0.4394	<.0001	0.2133	0.1168	0.2984	0.5278	0.1170	0.7529	0.1220	0.1499	0.8758	0.1212	0.6206	0.2225
NEP 4	0.0151	0.7324	0.2133	<.0001	0.0589	0.1066	0.1921	0.0007	0.8504	0.0095	0.0132	0.0617	0.0160	0.3859	0.0285
NEP 5	0.0145	0.5370	0.1168	0.0589	<.0001	0.7268	0.7417	0.0124	0.8602	0.0020	0.0241	0.1950	<.0001	0.0810	0.0192
NEP 6	0.0040	0.5735	0.2984	0.1066	0.7268	<.0001	0.1986	0.0525	0.9036	0.0409	0.2164	0.0169	0.3145	0.1532	0.2220
NEP 7	0.1818	0.8759	0.5278	0.1921	0.7417	0.1986	<.0001	0.1906	0.1051	0.0012	0.6487	<.0001	0.3393	0.7041	0.7617
NEP 8	0.0032	0.9309	0.1170	0.0007	0.0124	0.0525	0.1906	<.0001	0.0346	0.0023	0.0524	0.0266	0.0104	0.4798	0.1991
NEP 9	0.4103	0.2063	0.7529	0.8504	0.8602	0.9036	0.1051	0.0346	<.0001	1.0000	0.3652	0.9189	0.2749	0.6854	0.6693
NEP 10	0.0068	0.6977	0.1220	0.0095	0.0020	0.0409	0.0012	0.0023	1.0000	<.0001	0.0856	0.0007	0.0001	0.2550	0.0219
NEP 11	0.0001	0.0197	0.1499	0.0132	0.0241	0.2164	0.6487	0.0524	0.3652	0.0856	<.0001	0.8434	0.0060	0.2473	<.0001
NEP 12	0.1044	0.5587	0.8758	0.0617	0.1950	0.0169	<.0001	0.0266	0.9189	0.0007	0.8434	<.0001	0.4658	0.2889	0.0721
NEP 13	0.0117	0.5363	0.1212	0.0160	<.0001	0.3145	0.3393	0.0104	0.2749	0.0001	0.0060	0.4658	<.0001	0.0708	0.1434
NEP 14	0.9892	0.2781	0.6206	0.3859	0.0810	0.1532	0.7041	0.4798	0.6854	0.2550	0.2473	0.2889	0.0708	<.0001	0.3152
NEP 15	0.0403	0.0975	0.2225	0.0285	0.0192	0.2220	0.7617	0.1991	0.6693	0.0219	<.0001	0.0721	0.1434	0.3152	<.0001

Appendix F.

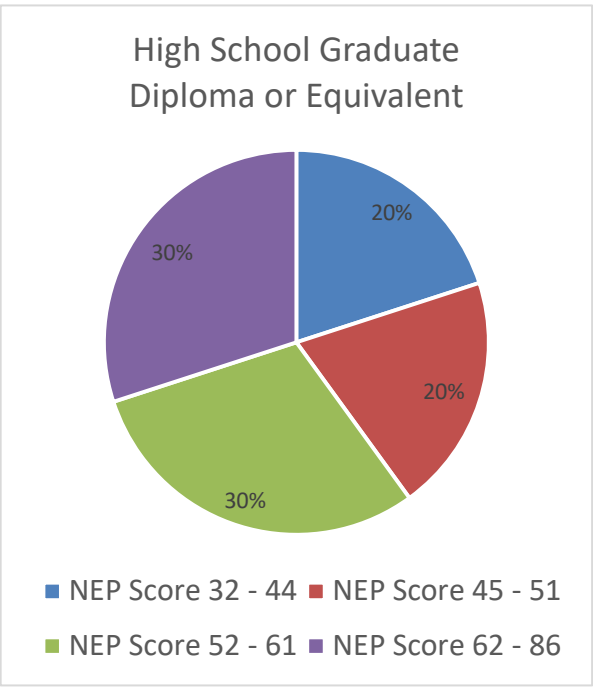
Job descriptions

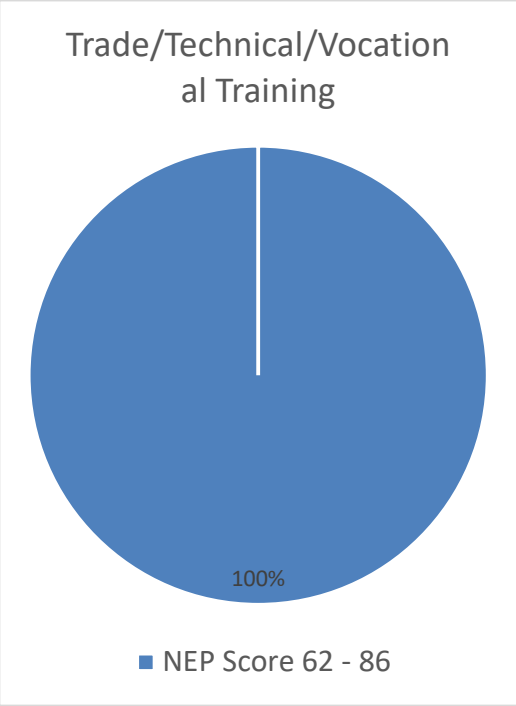
Job description given by respondent	Job description used for analysis
Forest, timber manager	Logger
Owner - operator	Logger
Log Buyer/seller; resource manager	Non-Logger
Timber cutter	Logger
Owner logging and gravel operation	Logger
owner	Logger
Log buyer	Non-Logger
log buyer/ forester	Non-Logger
Timber faller	Logger
Equipment operator	Logger
Land management	Non-Logger
Forester	Non-Logger
Forest engineer	Non-Logger
Log buyer	Non-Logger
timber manager/logging employee	Logger
Foreman for a cable logging company	Logger
Engineer, crew management	Non-Logger
Shovel operator, owner	Logger
Logger	Logger
Logger	Logger
Log buyer	Non-Logger
Forester/own a logging company	Logger
logger	Logger
shovel operator	Logger
processer operator	Logger
logger	Logger
forester/logger-harvester operator	Logger
equipmente operator - hand faller	Logger
log buyer	Non-Logger
Stream restoration and building logging roads	Non-Logger
Log buyer	Non-Logger
Log buyer	Non-Logger
owner	Logger
Logger	Logger
Forester/Logger	Logger

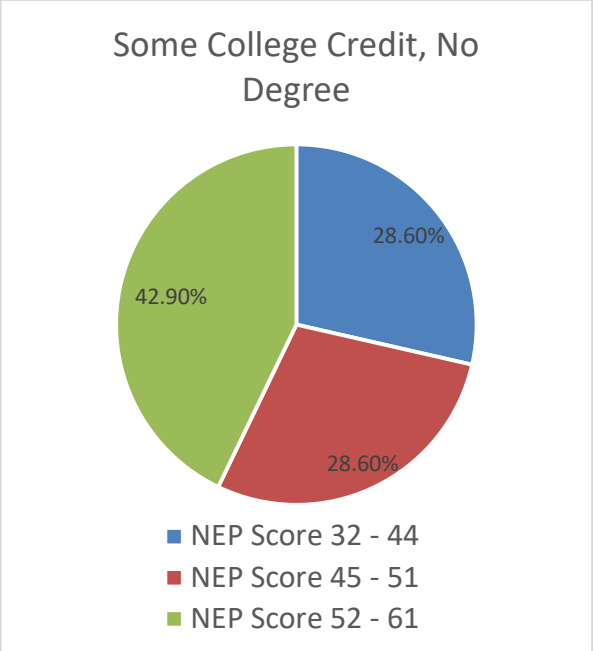
Foreste/Pole buyer/sawmill owner	Non-Logger

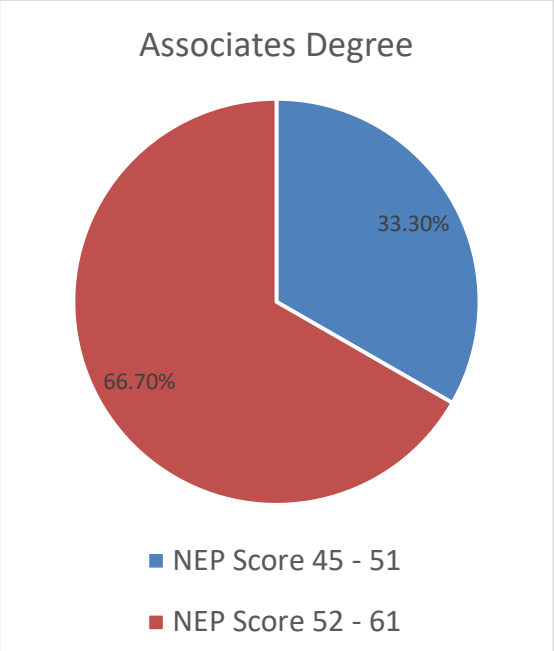
Appendix G.

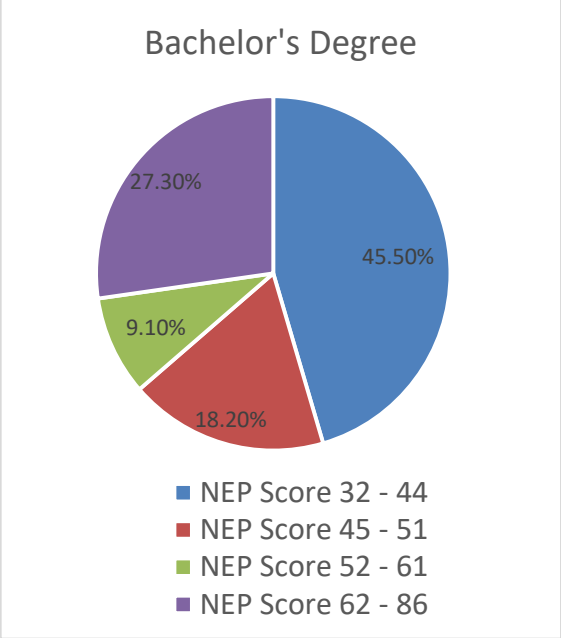
Pie charts for respondents NEP scores compared to the highest education level they attained.

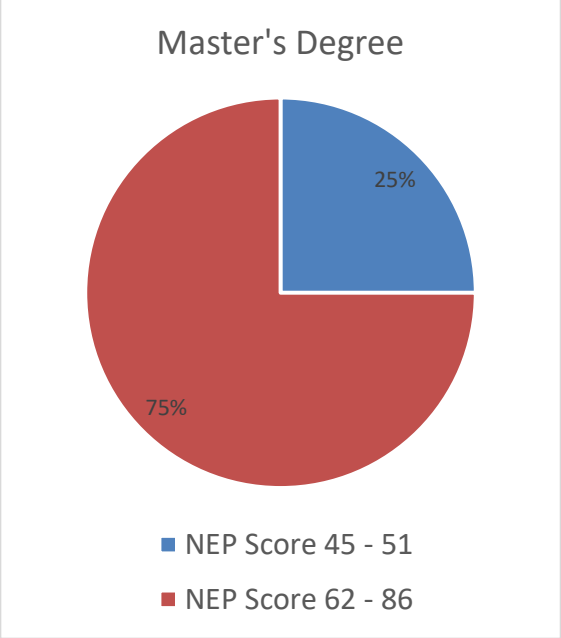






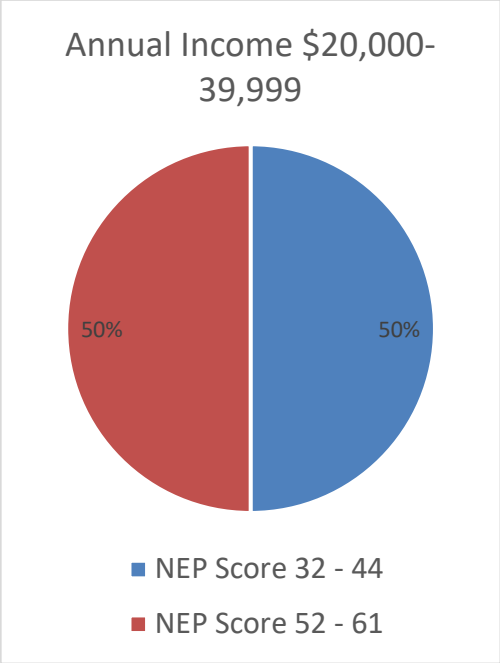


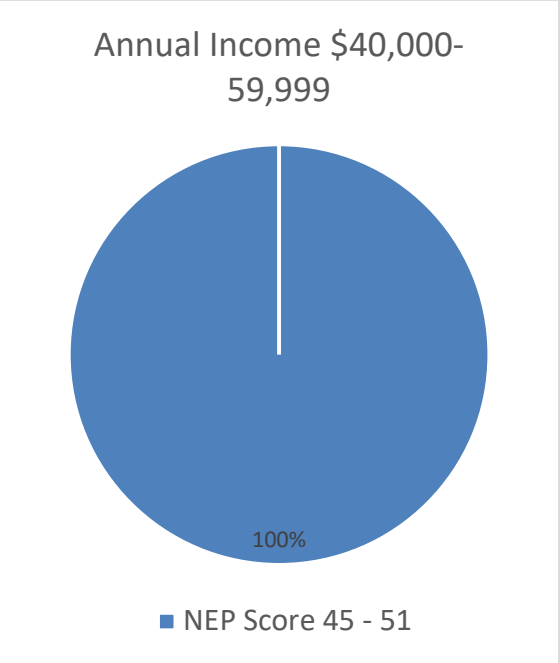

Bachelor's Degree
27.30%
45.50%
9.10%
18.20%
NEP Score 32 - 44
NEP Score 45 - 51
NEP Score 52 - 61
NEP Score 62 - 86

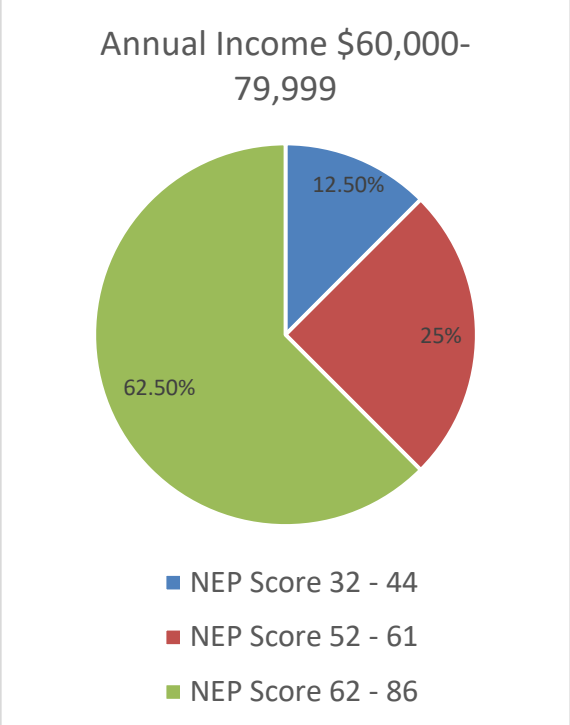

Master's Degree
25%
75%
NEP Score 45 - 51
NEP Score 62 - 86

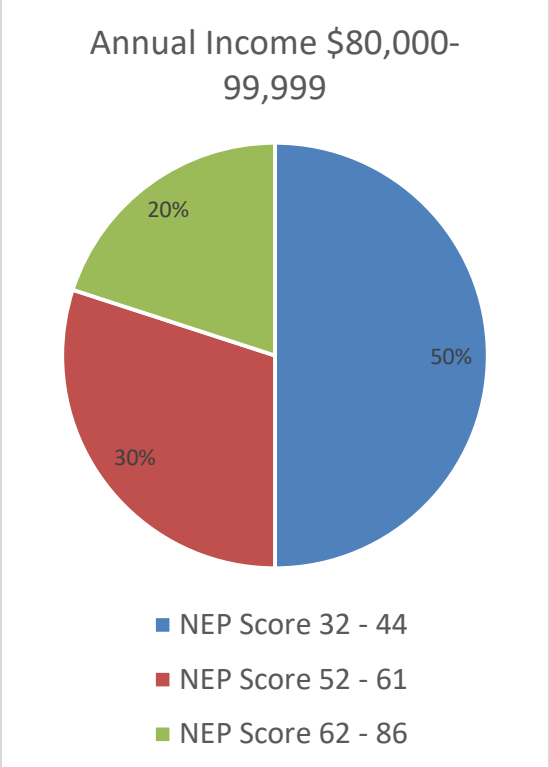
Appendix H.

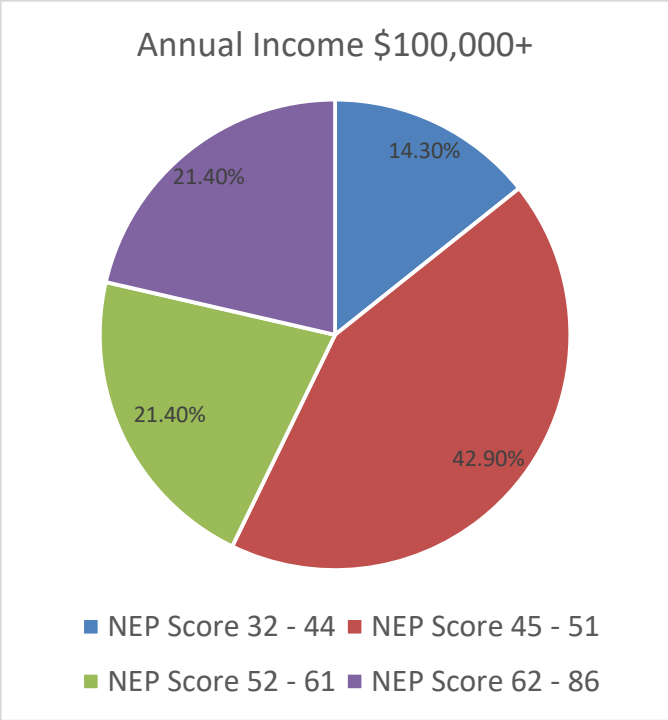
Pie charts for respondents' NEP scores for the different reported levels of income.










Annual Income $100,000+
14.30%
42.90%
21.40%
21.40%
NEP Score 32 - 44
NEP Score 45 - 51
NEP Score 52 - 61
NEP Score 62 - 86

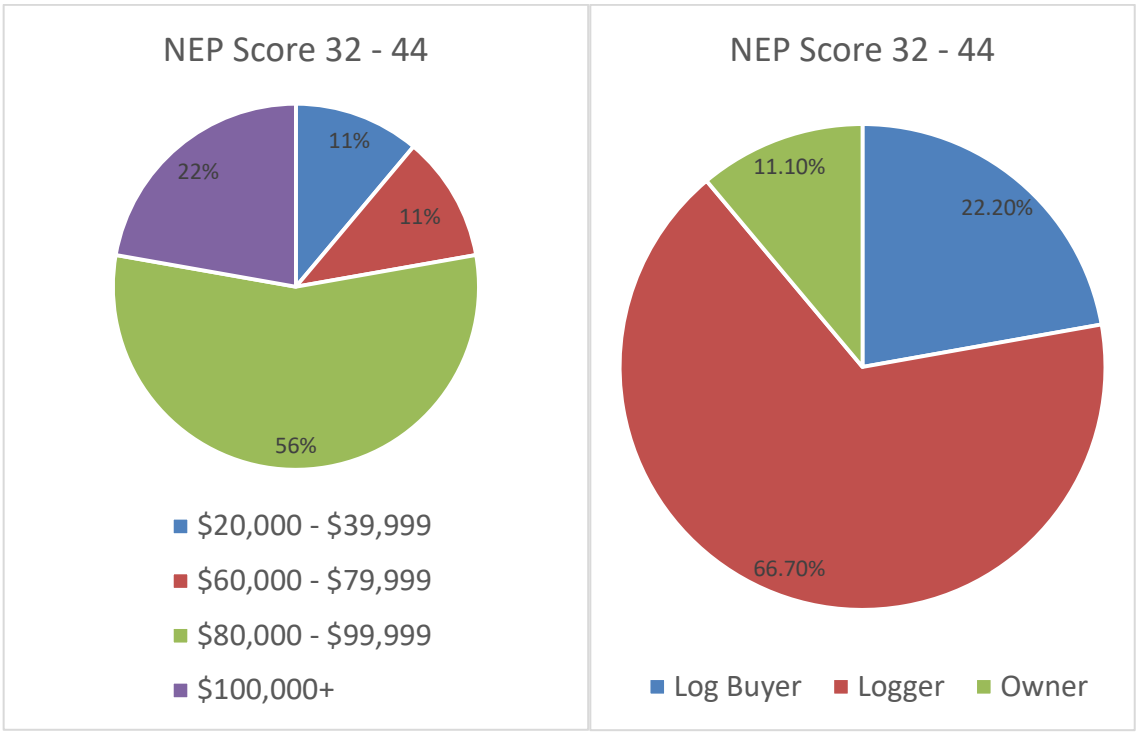
Appendix I.

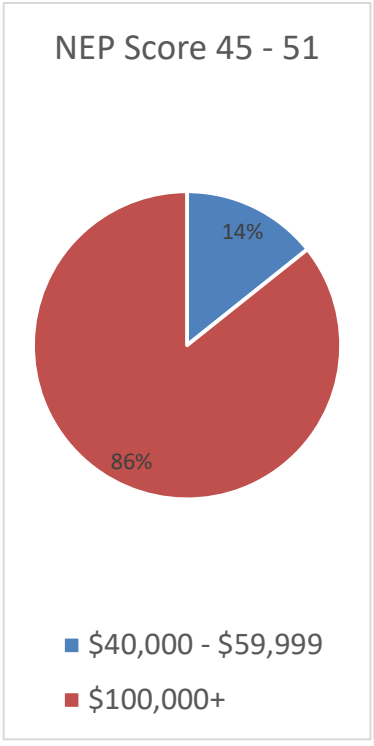
Pie charts of NEP quartiles split into columns and rows correlating to highest education level achieved and job

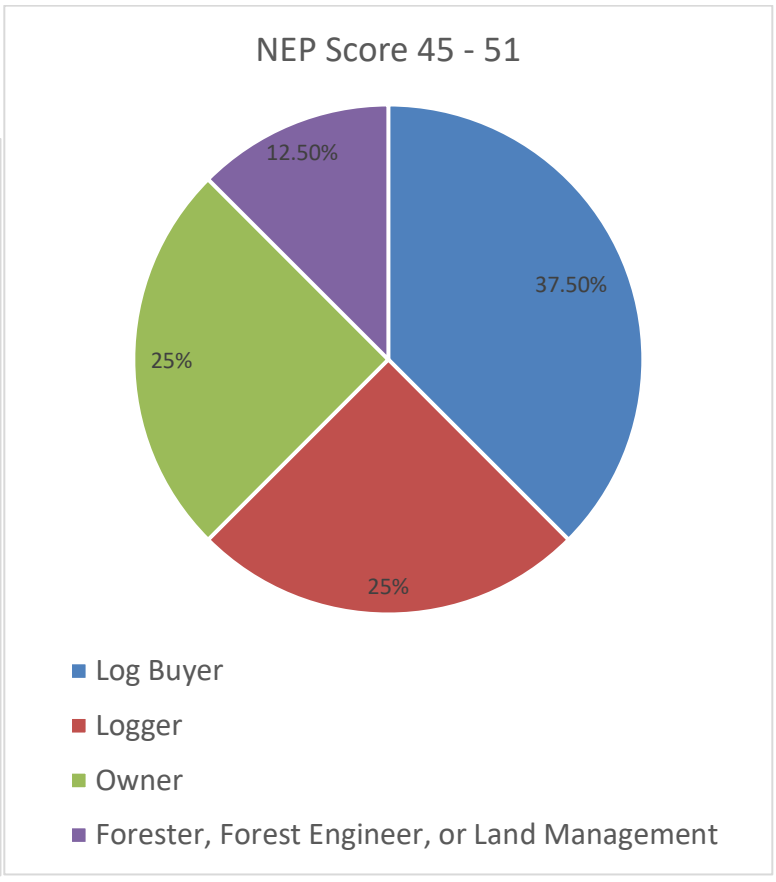
	$20,000 - $39,999	$40,000 - $59,999	$60,000 - $79,999	$80,000 - $99,999	$100,000+
High School Graduate Diploma or Equivalent					
Trade/Technical/Vocational Training					
Some College Credit, No Degree					
Associates Degree					
Bachelor's Degree					
Master's Degree					

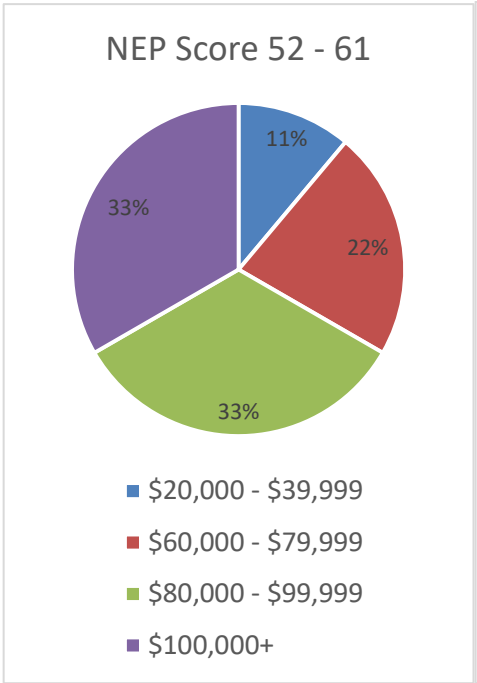
Appendix J.

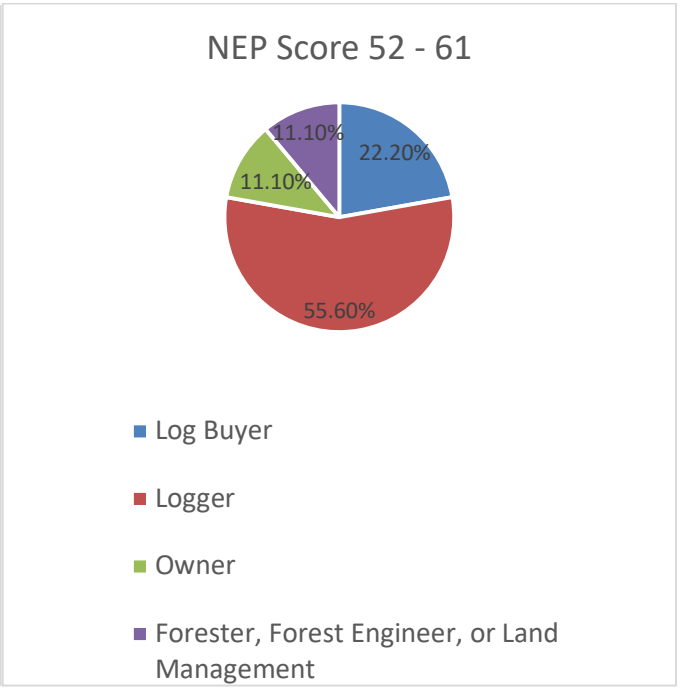
Pie charts for NEP quartiles side by side comparisons for annual income and job.

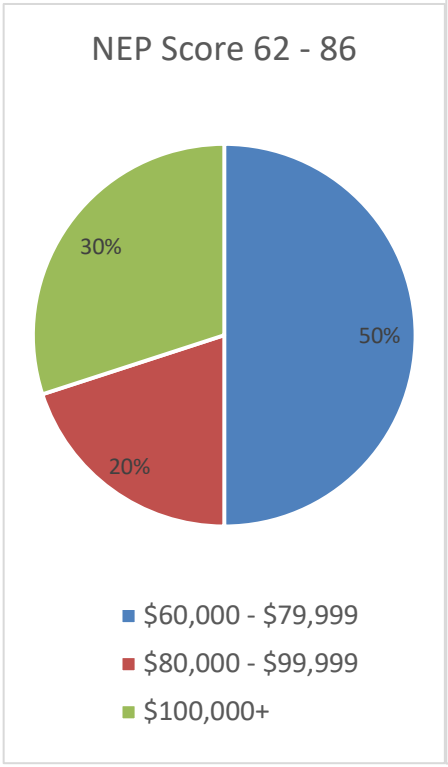


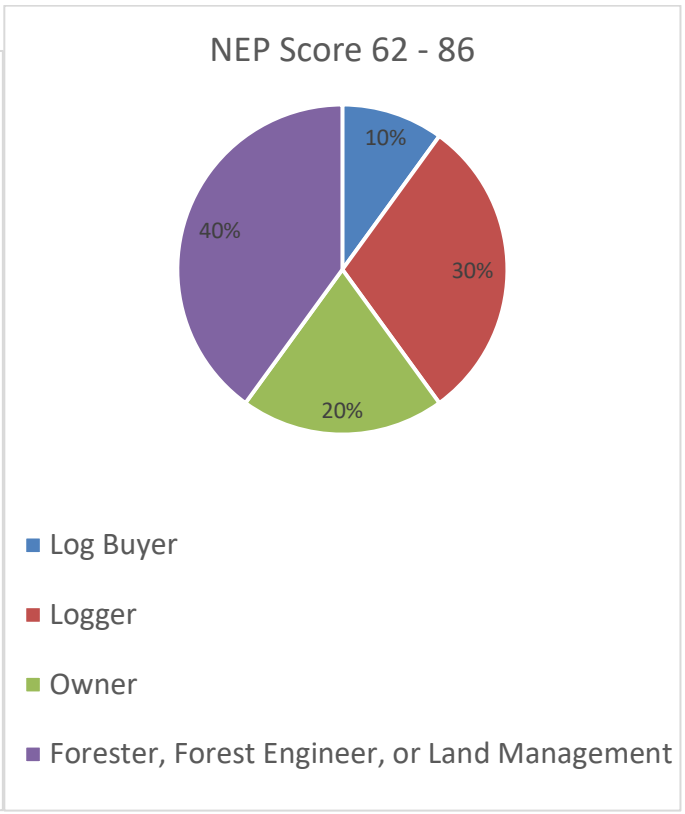

NEP Score 45 - 51
14%
86%
$40,000 - $59,999
$100,000+


NEP Score 45 - 51
12.50%
37.50%
25%
25%
Log Buyer
Logger
Owner
Forester, Forest Engineer, or Land Management


NEP Score 52 - 61
11%
22%
33%
33%
$20,000 - $39,999
$60,000 - $79,999
$80,000 - $99,999
$100,000+

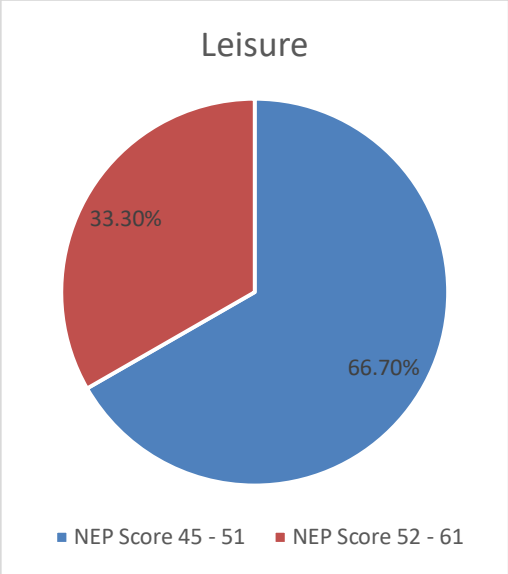

NEP Score 52 - 61
11.10%
22.20%
11.10%
55.60%
Log Buyer
Logger
Owner
Forester, Forest Engineer, or Land Management

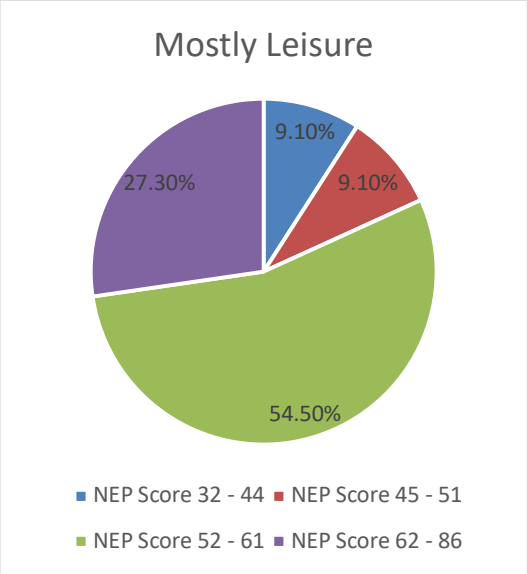

NEP Score 62 - 86
50%
20%
30%
$60,000 - $79,999
$80,000 - $99,999
$100,000+

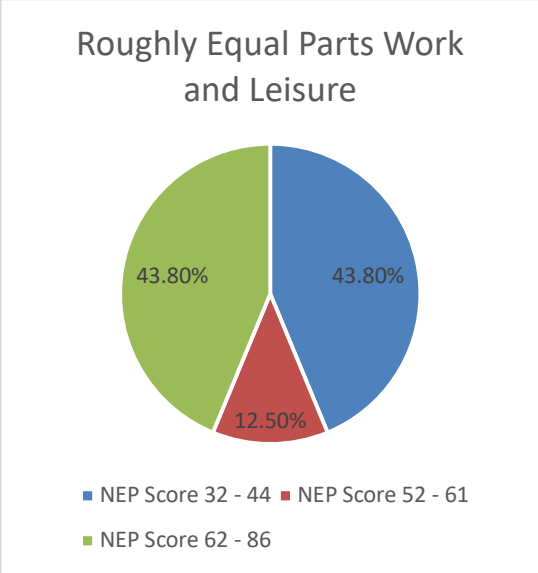

NEP Score 62 - 86
10%
30%
20%
40%
Log Buyer
Logger
Owner
Forester, Forest Engineer, or Land Management

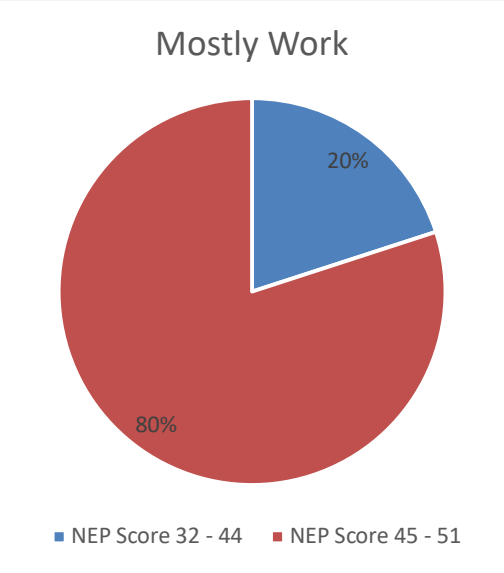
Appendix K.

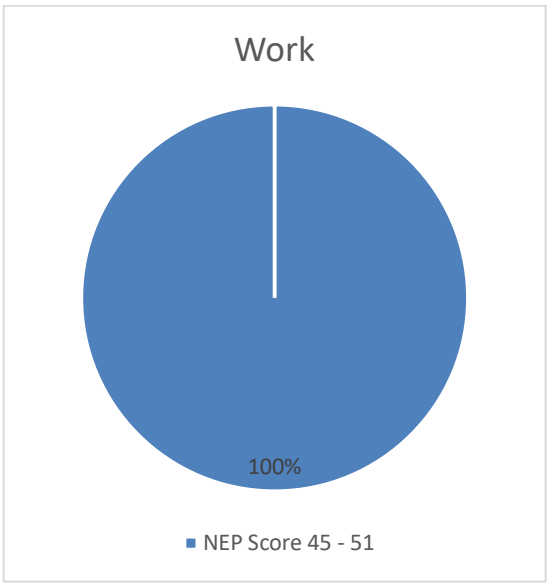
Pie charts showing NEP scores for the time in nature characterization.





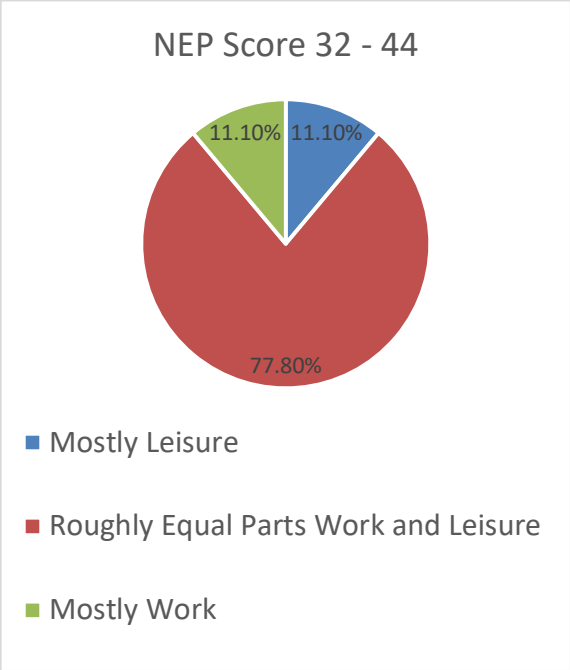


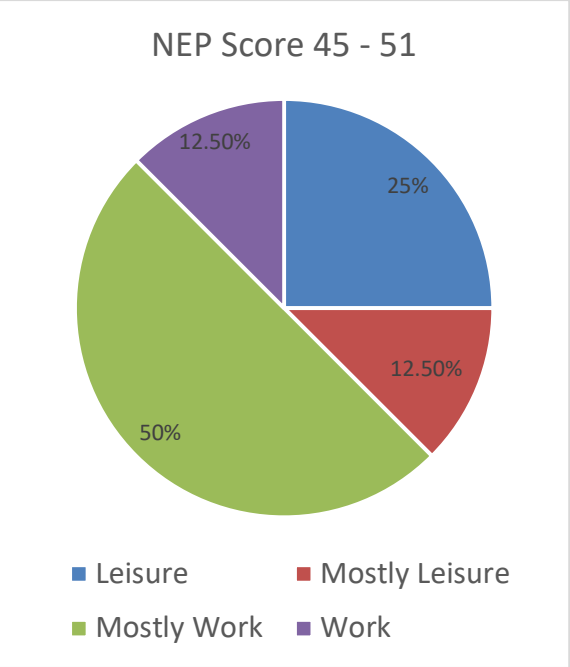


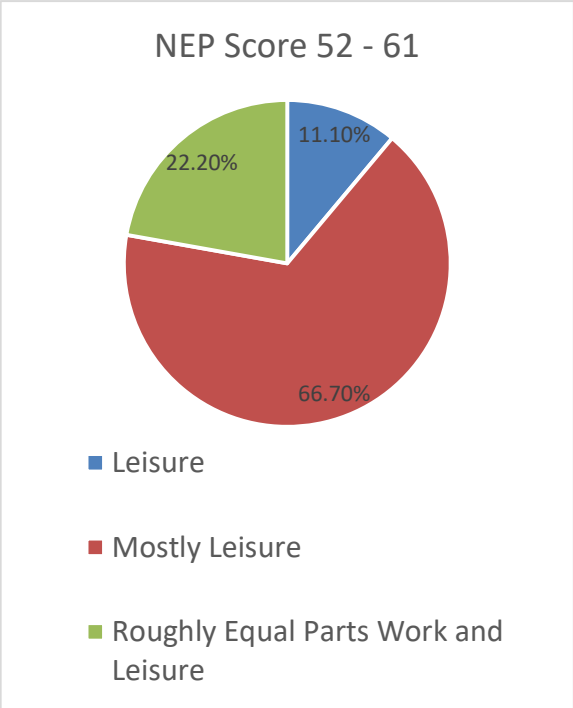

Work
100%
NEP Score 45 - 51

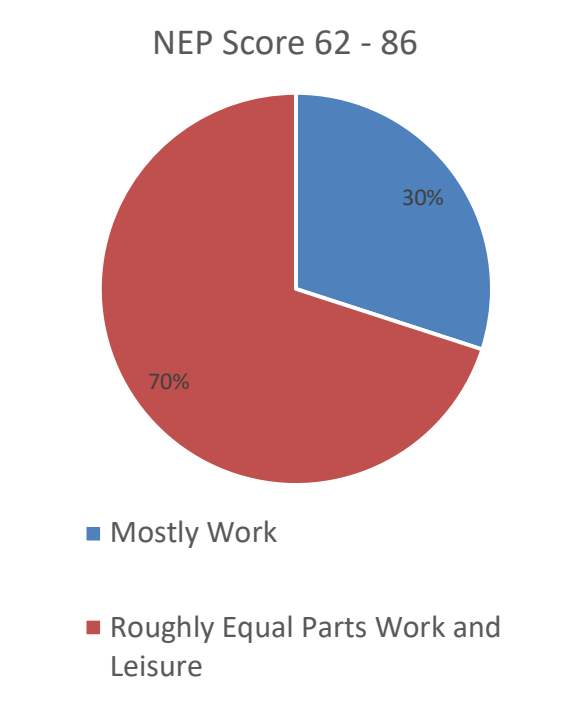
Appendix L.

Pie charts for the NEP score quartiles and how individuals within that range spent their time in nature.









Appendix M.

Multivariate Analysis of NEP Total Scores Compared to Average Yearly Income

Annual Income of $20,000 - $39,999 vs. Respondent's Total NEP Score, and Total NEP Facet.

	Total NEP Score	Limits to Growth Facets	Anti-anthropocentrism Facet	Balance of Nature Facet	Rejection of Exemptionalism	Possibility of Eco-crisis Facet
Total NEP Score	1					
Limits to Growth Facets	1	1				
Anti-anthropocentrism Facet	1	1	1			
Balance of Nature Facet	1	1	1	1		
Rejection of Exemptionalism	1	1	1	1	1	
Possibility of Eco-crisis Facet	0	0	0	0	0	1

Annual Income of $40,000 - $59,999 vs. Respondent's Total NEP Score, and Total NEP Facet.

	Total NEP Score	Limits to Growth Facets	Anti-anthropocentrism Facet	Balance of Nature Facet	Rejection of Exemptionalism	Possibility of Eco-crisis Facet
Total NEP Score	1					
Limits to Growth Facets	0	1				
Anti-anthropocentrism Facet	0	0	1			
Balance of Nature Facet	0	0	0	1		
Rejection of Exemptionalism	0	0	0	0	1	
Possibility of Eco-crisis Facet	0	0	0	0	0	1

Annual Income of $60,000 - $79,999 vs. Respondent's Total NEP Score, and Total NEP Facet.

	Total NEP Score	Limits to Growth Facets	Anti-anthropocentrism Facet	Balance of Nature Facet	Rejection of Exemptionalism	Possibility of Eco-crisis Facet
Total NEP Score	1					
Limits to Growth Facets	0.6909	1				
Anti-anthropocentrism Facet	0.5574	-0.1762	1			
Balance of Nature Facet	0.7787	0.5238	0.2788	1		
Rejection of Exemptionalism	0.4999	0.2274	0.6003	-0.0082	1	
Possibility of Eco-crisis Facet	0.9152	0.648	0.4321	0.7923	0.1690	1

Annual Income of $80,000 - $99,999 vs. Respondent's Total NEP Score, and Total NEP Facet.

	Total NEP Score	Limits to Growth Facets	Anti-anthropocentrism Facet	Balance of Nature Facet	Rejection of Exemptionalism	Possibility of Eco-crisis Facet
Total NEP Score	1					
Limits to Growth Facets	0.7961	1				
Anti-anthropocentrism Facet	0.7319	0.3070	1			
Balance of Nature Facet	0.7641	0.8402	0.3557	1		
Rejection of Exemptionalism	0.3533	0.0331	0.3917	-0.2724	1	
Possibility of Eco-crisis Facet	0.7039	0.5573	0.2643	0.7646	-0.1026	1

Annual Income of $100,000+ vs. Respondent's Total NEP Score, and Total NEP Facet.

	Total NEP Score	Limits to Growth Facets	Anti-anthropocentrism Facet	Balance of Nature Facet	Rejection of Exemptionalism	Possibility of Eco-crisis Facet
Total NEP Score	1					
Limits to Growth Facets	0.7027	1				
Anti-anthropocentrism Facet	0.6577	0.3965	1			
Balance of Nature Facet	0.5933	0.1226	0.0401	1		
Rejection of Exemptionalism	0.3149	0.1948	0.2408	-0.0000	1	
Possibility of Eco-crisis Facet	0.7727	0.3793	0.3503	0.5991	-0.1296	1