INVESTIGATING SCUBA DIVERS' ATTITUDES TO SUSTAINABLE SHIPWRECK DIVING IN NORTH CAROLINA

by

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This study examined the ways in which NC scuba divers identify sustainable shipwreck diving activities to gain a better understanding of how their behavior impacts sustainable cultural tourism on the coast of North Carolina. The information collected by this study revealed the norms of respondents regarding how human activities affect the sustainability of submerged maritime archaeological sites. This was done by comparing diver characteristic variables in relation to attitudes regarding a multitude of sustainable shipwreck diving activities as they were defined by previous literature (Stone 1996; McCarthy 2000; Jewell 2004; Edney 2006). Results concluded that divers that belong to archaeological organizations tended to define sustainable diving activities as the literature does. The most experienced divers not a member of these groups tend to disagree with the literature when it comes to identifying sustainable diving activities.

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Chapter 1: Introduction

Shipwrecks provide archaeologists and historians a way to view the past. Shipwreck sites are more than just the remains of a sunken vessel; they often include cargo, personal items, tools, utensils, and other diagnostic artifacts. As a result, shipwrecks not only provide a window into the individual lives of the men and women who were shipbuilders, sailors, and longshoremen, but also allow for a better understanding of the larger role of maritime commerce and exploration in the maritime world of the past (Wisconsin Historical Society 2013). As such, shipwrecks are an important, and growing, part of the international and domestic travel scene because of their status as locations with cultural heritage tourism potential (O'Neil et al. 2000).

As a means to explore such shipwrecks, scuba diving has become a major component of global tourism that is significant to local economies (Edney 2012). Underwater archaeological sites are noteworthy in the tourism industry, and having a sustainable management system in place is vital not only for the protection of cultural heritage, but also for the economies that depend on revenues from their value (Jewell 2004).

Since the 1980s, heritage has increasingly been used for commercial purposes in the form of heritage tourism (Leader-Elliot 2001:69), the product of the ideas that are attached to a place, structure, or artifact. The physical component of heritage is only a part of the attraction, and it is less important than the story of the people associated with the item or space (Carter and Horneman 2001). Because of this, heritage installations (such as museums), in which items are removed from their original context are antithetical to some heritage markets because they cannot attract or satisfy a market looking for the type of authentic place-based experience that gives cultural heritage tourists the ability to "go deeper" into the history of a site. In contrast, places, buildings, structures, and artifacts that are left in place ("in situ" in archaeological

parlance) can be understood in terms of their special proximity and connection to the people linked to the heritage sites (Carter and Horneman 2001:67-68). Yet, while providing a more authentic and complete experience, the option of viewing wrecks in situ can be just as damaging to the site as removing items. As shipwrecks are easily damaged non-renewable heritage sites, they have a certain "carrying capacity", a threshold above which visitation may lead to adverse impacts to the archaeological site's integrity (Heritage Australia 2013).

Consider for example, some of the diver behaviors that are detrimental to shipwrecks. Anchor damage could possibly be the most damaging of the intentional or unintentional impacts of recreational diving and fishing. Artifact collection is a second source of negative impacts that divers have on shipwrecks. Possible motivations for artifact collection by divers include the desire to keep a lasting or tangible reminder of the wreck diving experience, to own a piece of history, or to create a sense of connection to the wreck and history. Inexperienced divers, unsecured equipment, incorrect weighting, or poor buoyancy control are also all causes for damaging direct contact with wrecks. When this direct contact occurs, metal or timber is often exposed, which accelerates corrosion and deterioration. Exhaled air bubbles are one final contributor to the deterioration and increased corrosion of wrecks by increasing oxidation (Jewell 2004; Edney 2006). By considering and monitoring all of these adverse behaviors and effects, diving sites can determine site carrying capacity and ensure that submerged maritime archaeological sites remain a tourism asset for generations to come.

The purpose of this study is to gain insight into diver perspectives in an attempt to gauge its implications on sustainable tourism. This is accomplished by examining diver characteristics, motivations for wreck diving, and attitudes of divers toward governmental regulation of shipwrecks. The primary research question asked by this study is, "What are the attitudes of

people scuba diving in the state of North Carolina (scuba divers being defined as people utilizing dive charters in the state of North Carolina) towards human actions that may negatively impact the preservation (and sustainability) of submerged maritime archaeological sites?" In order to answer this question, a series of secondary research questions will be asked. The following questions address both sustainable and non-sustainable behaviors. They include:

1. To what extent do NC divers feel inclined to engage in "sustainable practices" in relation to shipwreck diving?
2. What are the attitudes of divers in relation to:
    a. Sustainable anchoring activities?
    b. Preservation of shipwreck structures and their context?
    c. Preservation of shipwreck features and their context?
    d. Preservation of surface artifacts and their context?
    e. Preservation of buried artifacts and their context?
3. What is the role of geographical origin, level of training and experience, gender, and other demographic variables in understanding diver attitudes towards their shipwreck diving practices?

In order to answer these questions, two theories will be employed. The first theory emerges from Cultural Resource Management (CRM) practices and the second is normative theory. CRM will be used to define sustainable actions as they apply to shipwreck diving in order to get an academic definition of these acts to compare them to the actual practices of divers. Normative theory will be used to gauge divers' behavior in terms of acceptability of

sustainable practices. These theories will become the conceptual basis for this study, and will serve as the organizing structure by which these research questions will be answered

Chapter 2: Literature Review

This literature review is broken into five parts: Cultural Resource Management, diver impacts on shipwrecks, surveys of scuba divers' attitudes, normative theory, and diver training literature. CRM will play a key role in defining sustainable diver behavior. Normative theory will serve as the underlying theory of this research, so a history of the theory is explained below. Literature regarding divers' impacts on shipwrecks was reviewed in order to determine which divers' behaviors have negative impacts on shipwrecks, and diver training literature was reviewed in order to better understand behaviors of NC divers in training.

Studies done within the United States have primarily focused on reef diving and not wreck diving as seen in Goldberg (1973), Hawkins et al. (1999), Barker and Roberts (2004), Herring (2006), Sorice et al. (2007), Williams et al. (2008), Krieger and Chadwick (2012), and Loomis et al. (2012). While these studies did not focus on maritime archaeological sites, they nevertheless serve to inform the data collection methods intended for use in this study to provide a clear method for analyzing general diver behavior.

Also pertinent to this study is research examining the ways in which tourism uses resources. McKercher and du Cros (2002) argued that tourism, in and of itself, consumes resources and has social, cultural, and environmental impacts that appear inevitable. However, the severity of these impacts can be mitigated through an understanding of the impacts that tourism has on host communities and host environments; it is an industrial activity that consumes resources, creates waste, and needs infrastructure. Additionally, as a consumer of resources, it has the potential to over use its assets and must compete for scarce resources to survive. Likewise, tourism is largely a multi-faceted private sector industry predominantly driven by profit maximization, making it difficult to control.

Also, tourists are consumers and not anthropologists, tourism is entertainment, and tourism generates income by importing clients instead of exporting products (see McKercher and du Cros 2002). Accepting these as truths, it becomes possible to understand the fundamentals of sustainable tourism in order to maximize the benefits while minimizing the costs. This is applicable in shipwreck diving as a tourism activity because so long as divers have an impact on their dive sites, there needs to be a method to mitigate these impacts. According to McKercher and du Cros (2002:43), developing methods to manage assets in a truly sustainable manner is undoubtedly in the best interest of all concerned: the asset, the managers of the asset, and the surrounding community, and tourism is increasingly being seen as a potential use for heritage.

2.1 Cultural Resource Management

Outside the United States, culture heritage management (CHM) is the preferred nomenclature over cultural resource management (CRM). The term *resources* implies economic value, while the term *heritage* recognizes the noneconomic value of the asset. For this reason, McKercher and du Cros (2002:43) used the term CHM and defined it as "the systematic care taken to maintain the cultural values of cultural heritage assets for the enjoyment of present and future generations". The driving force behind the sustainable management of these resources is that it is in the best interest of the asset, managers of the asset, and any adjacent community. The chief goal of CHM is to conserve a representative sample of tangible and intangible heritage for use by future generations (McKercher and du Cros 2002). CRM and CHM will be used interchangeably. In terms of underwater shipwrecks, CHM can be summed up as a method of interacting with a ship's cultural resources in a way that prolongs their use for humankind and ecosystems alike. It is also notable that CHM is still a fairly new concept that is continuously

going through cycles because once the value of the culture is first recognized, political interest grows and the level of professionalism increases with it (McKercher and du Cros 2002).

Cultural management practices have been applied to shipwrecks around the globe, and there have been efforts to protect them. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) developed what is known as the 2001 Convention in response to an absence of regulation or lack in uniformity of regulations. The 2001 Convention was an elaboration of the 1982 United Nations Convention on the Law of the Sea (UNCLOS), which is an international treaty that includes more than 150 State Parties. Under UNCLOS, the state parties are required to protect underwater cultural heritage, but it does not explicitly state the details of how to protect the cultural heritage (UNESCO 2007).

The 2001 Convention was designed to be used in conformity with other international law including UNCLOS, and set a high standard for the protection of underwater cultural heritage by including the idea of protecting sites from looting and destruction. The 2001 Convention laid out principles of conduct that protect underwater cultural heritage, facilitated an international cooperation scheme, and provided guidance for the handling of such heritage. Joining the Convention was seen to be beneficial by historic preservationists because it prevents commercial exploitation of underwater cultural heritage, preserves the heritage in place, is beneficial to the tourism industry, allows knowledge expansion, and allows for international cooperation (UNESCO 2007). The US is not currently a signatory for the Convention.

The basic principles of the Convention work to preserve the underwater cultural heritage by making it obligatory for countries to preserve underwater sites and, by giving proper respect to all human remains in maritime waters. The Convention also established that *in situ* (in place or on the seabed) is the most preferred method of interacting with a site. Exceptions have been

made for the recovery of objects that make a significant contribution to the protection of or knowledge about cultural heritage. Furthermore, commercial exploitation and speculation of underwater cultural resources is not allowed under the Convention. Member nations sign on to the Convention, promoted via training in underwater archaeology, and in doing so raise public awareness of the significance of underwater cultural heritage (UNESCO 2007).

It is important for site managers to collaborate with the tourism industry for sustainable management of such sites; however, tourism needs are not the single driving force in CHM. The needs of tourists are just one part of several considerations that need to be taken in order to manage culture heritage sites. Site managers must magnify the positive impacts of tourism while reducing negative impacts as in order to balance cultural tourism with conservation interests (McKercher and du Cros 2002). For this research, specific actions of shipwreck divers need to be identified in order to best satisfy the needs of CRM. In order to do this, the actions of divers' that negatively impact shipwrecks during their use were identified to determine whether or not divers in NC engage in such behaviors.

2.2 Diver Impacts to Shipwrecks

Edney (2006) pointed out that exhaled air bubbles from divers penetrating wrecks accelerates corrosion and affects the stability and longevity of the wreck in three ways. First, the bubbles damage the layer of marine growth, second, setting vertical currents in motion that remove the protective layer of rust, and lastly by accelerating the corrosion rate through the increased supply of oxygen (Edney 2006:219). A second type of impact occurs when divers make direct contact with a wreck. Marine organisms can be disturbed and destroyed which leaves the metal exposed and accelerates corrosion and deterioration of the wreck. Inexperience, unsecured equipment, incorrect weighting, and poor buoyancy control are all ways in which

divers make direct contact with wrecks (Edney 2006:218). Divers coming in to contact with a shipwreck are often not aware that this direct interaction may adversely affect the layer of protective marine growth covering it, hence damaging both marine life, and the submerged structure (Jewell 2004).

Additionally, hanging onto the structure of a shipwreck may be harmful to it. For example, the SS *President Coolidge*, once an intact shipwreck, has been broken off "by bloody stupid divers" hanging onto its exposed frames (Stone 1996:181). Another protector of iron shipwrecks is concretions that form a layer on top of the iron. These concretions slow the movement of corrosion products away from the rusting iron, which results in the production of an acidic iron-rich corrosive solution (McCarthy 2000:91). Areas with frequent diver traffic are susceptible to mechanical damage from divers' equipment such as tanks breaking off the concretion layer (Edney 2006:218).

At one time, it was through that iron hulls were relatively preserved where buried in sediment (like wooden shipwreck remains), but corrosion specialists have found that galvanic corrosion continues on iron hulls whether buried or not. However, this does not mean that sediment type and oxygenation (sediments can be aerobic or anaerobic) does not provide some degree or protection. It simply means that an iron or steel hull may be degrading at faster or slower rates depending on sediment cover (McCarthy 2000:91-92).

While removal of artifacts can lead to extensive damage to wrecks, divers searching for artifacts often dislodge and disturb objects, which destabilizes the wreck and leaves it more vulnerable to further dispersal by wave action and currents, and accelerates corrosion and deterioration of the wreck (Edney 2006:217). Furthermore, it is also common for artifacts to be handled by divers. This happens when divers touch or move artifacts to better examine them and

when dive guides place artifacts in strategic locations around wreck sites to show divers, often, by passing them around. This type of disturbance not only accelerates corrosion and deterioration by removing protective coatings around objects, but can also weaken the integrity of the wreck site. Lastly, handling artifacts in the manner diminishes the cultural heritage values of a wreck especially in terms of the archaeological potential of the site (Edney 2006:217).

One other thing to consider when it comes to artifact collection is the displacement of artifacts during the shipwreck in relation to the location of the wreck itself once it has hit the seafloor. Muckelroy (1978) described a shipwreck as the event in which a highly organized and dynamic assemblage of artifacts is made into a static and disorganized state with lasting stability. While the archaeologist is forced to study the disorganized state, the real interest lies in the organized state of the ship before the wreck. This makes defining the wreck a broad term that includes the continued breakup of the wreckage on the seabed and the stages by which it got there, until it becomes part of the seascape. The end result of a shipwreck can take many shapes depending on environmental conditions as evidenced in Muckelroy (1978). Since *shipwreck* is defined as the entire ship before it sank, artifact collection includes artifacts that are scattered far from the shipwreck site itself.

Anchor damage is another major threat to shipwrecks that has been connected to the recreational scuba diving of shipwrecks; anchors have been considered more damaging to wrecks than any other impacts of diving. A small reef anchor attached to 16-foot boat can exert great force and cause significant physical damage to a wreck. Timbers, fittings, and superstructure are easily broken, and protective concretions and marine growth become removed by anchors. If iron is uncovered in this manner, renewed corrosion is generated on affected parts, and it has

been reported that these parts corrode 10 times faster than prior to the damage occurring (Edney 2006:214).

2.3 Surveys of Scuba Divers' Attitudes

There are a number of studies that have examined diver motivations, attitudes, and behaviors in general. These studies have been conducted in diverse locations across the globe and touch on a variety of topics pertinent to both professional divers and hobbyists. These topics include divers' opinions about the external forces that influence their work - such as legal statutes, environmental regulations and state control of archaeological remains. Also touched on in these studies are the personal sentiments of divers – their own individual motivations and reflections about why they dive and what experiences they seek as outcomes of their diving.

In one example of a study highlighting the legality of diving, Davis (1997) analyzes recreational scuba diver motivations and approaches to management of the diving industry in an Australian Marine Protected Area (MPA), deeming that governmental intervention is necessary to prevent degradation of the marine environment from overcrowding. Davis's findings thereby support the view that in order for a maritime archaeology program to be effective, two things are needed. First, specific legislation that protects shipwrecks and, second, cooperation of the dive community (Davis 1997).

The environmental factor comes into play in Todd et al.'s (2001) report comparing diver level of skill/development with environmental beliefs. Todd et al. (2001) compared divers' attributes of responsibility with the site's management preferences regarding the use and management of New York's Great Lakes underwater environment. The authors found that while divers of all skill levels tend to disagree that the bubbles they emit have a negative impact on the shipwrecks, skill level did have an impact on other aspects of diver perception. For instance,

beginner divers tend to support more invasive practices of fines and believe that is not acceptable to recover or touch objects. Conversely, a significant portion of older, more experienced divers are more open to the collection of artifacts. The authors point out that this could be because the older generation of divers grew up in a time when artifact collection was deemed acceptable. In addition their environmental focus, the authors also take the opportunity to depict interpretive tools and programs as assets to the dive community. Interpretive tools are effective for educating divers, and, in turn, lead to the prevention of damage to underwater resources. Interpretive programs recommend dive locations, assist with site selections, and build an understanding of the marine and cultural environment while assisting in the protection of shipwrecks.

Ditton et al. (2002) characterizes the sport diver population. Using artificial reefs off the coast of Texas as the site of his research, Ditton came to understand several diver characteristics and participation patterns, such as level of involvement in sport diving, diving motivations and attitudes, and management preferences. One particularly significant finding of Ditton's study is that while divers prefer to have a wide variety of materials and structures on which to dive, they most desire large naval ships.

Personal motivations are the emphasis of Meyer et al. (2003). Divers' reasons for diving are explored in this survey which sheds light on the dimensionality, stability, and importance of motives among scuba divers in North Central Florida. One particularly interesting discovery is the finding of significant differences between male and female divers in terms of their motivations. They found that males are more extrinsically driven to dive while females are more intrinsically driven. Extrinsic rewards are defined as recognition and an outlet to display one's findings to others, while intrinsic rewards are defined as challenge, personal testing, or decision-making.

Jewell (2004) assisted in the preservation and protection of the Australian wreck *Yongala* by developing an interpretive tool to communicate the wreck's cultural significance. This tool developed out of a testing for differences of interpretation regarding attitudes, awareness of values, and enhancement of diver experience in an attempt to determine if levels of diver experience and qualification influenced the effectiveness of a diver's interpretation of the shipwreck's significance. In her published survey, Jewell (2004) concludes that the tools she devised - double sided slates displaying archaeological facts of the wreck are effective in influencing attitudes, raising awareness of shipwreck values, and enhancing diver experience and that the slates are more effective for divers with higher diving qualifications.

Another study that centers on diver motivations is Tschapka's (2006) survey of scuba diving club members in New South Wales and Queensland. This study varies a bit from the other studies mentioned as it seeks to understand club members' motivations in scuba diving as they relate to the members' socio-demographic characteristics and setting preferences. Tschapka finds that motivations are key in the decision making process of adventure tourists and may vary with involvement in an activity, which in turn may influence behaviors and preferences for particular activities and settings.

Uyarra et al. (2009) provides the results of research performed on the Caribbean island of Bonaire in an effort to determine: a) which sites most regularly produce divers with positive reflections of their dive and which sites most regularly produce divers with negative reflections; b) whether or not divers' recollections of dive sites are related to the actual physical condition of dive sites; and c) what effect gender may have as a potential source of variability in perceptions. The study's results include evidence that the level of enjoyment by divers depends on dive site

conditions and that the accuracy a diver's recollections of the sites depends on dive site attributes (eg: aesthetic considerations) and gender of diver.

2.4 Diver Training Literature

The training manuals of two dive training organizations were examined to see what, if anything, was included on cultural resource management and artifact collection. The two major training organizations are the National Association of Underwater Instructors (NAUI), and the Professional Association of Diving Instructors (PADI), so their diving curriculums were examined.

PADI's manual, "Adventures in Diving", promotes wreck diving as exciting and adventurous, but is sternly against artifact recovery for two major reasons. First, once a popular wreck has been stripped of artifacts, it becomes far less interesting to dive on. Secondly, wrecks with historical significance need to be left undisturbed because historical facts that could have previously been discovered by an archaeologist can be permanently destroyed by simply moving something (PADI 2010).

NAUI's beginning manual, "Scuba Diver", mentions that while artifact collection is not only illegal in certain areas such as marine parks and state-controlled waters, removing an artifact from the wreck will generally destroy that part of the wreck. The manual goes on to state that removing artifacts takes away from historical value and atmosphere of the wreck, and that if enough people removed artifacts that the wreck will eventually be reduced to a pile of rubble on the sea floor (NAUI 2010). NAUI's more in depth training manual, "Advanced Scuba Diver", discusses the legal and ethical issues of wreck diving. In this part of diver training, NAUI reinforces that artifact collection is illegal in some areas, and points out that there are several examples of wrecks that were exemplary until divers removed all items of interest from the

wreck (NAUI 2013a). NAUI's diver instructor training manual, "Leadership and Instruction", encourages diving instructors to teach positive impact diving behavior through a proactive environmental approach as well as with diving practices that leave a minimal impact on the diving environment. This includes taking souvenirs and moving rocks that could interrupt organisms (NAUI 2013b).

Minimal impact water skills that are emphasized during NAUI training include buoyancy control, streamlining, and correct finning. Buoyancy control entails the diver be able to hover motionless at any point in the water column by using effective skills and proper weighting, and it is important because lack of control can contribute to environmental damage that stem from haphazard collisions. Streamlining consists of the diver swimming with arms close to the body and fluid leg movements without gear hanging lose from the diver. This becomes particularly important when entanglement risks are present, which is why hose and consoles should be secured and not dangling or dragging. Correct finning, the way a diver moves their fins, should be incorporated into the training to prevent damaging the environment by kicking up large amounts of sediment (NAUI 2013b).

Two other major diver training programs are Scuba Schools International (SSI) and Scuba Diver International (SDI). There is nothing mentioned on artifact collection in the training manuals of SSI to any extent (Colin Davidson 2014, elec. comm.). The only mention of artifact collection in SDI manuals is that many locations in today's society are protected parks or a protected area where artifact collection is against the law (Dennis M. Pulley 2014, elec. comm.).

2.5 Normative Theory

Norms are basic rules that advise people on what they should behave in a particular situation (Loomis et al. 2008). Personal norms are acceptable standards defined by the individual, and social norms are standards commonly held collectively between members of a social group. While personal norms contrast with social norms at times, an individual's norms typically parallel those of the social group which he or she belongs (Patterson and Hammitt 1990).

Cialdini et al. (1990) described two major types of norms, descriptive and injunctive. Descriptive norms describe a normative influence on behavior that *is*, which means which types of behavior are typical or normal. These include actions that most people partake in and it motivates people by being a normal course of action that people are likely to follow. Injunctive norms describe a normative influence that *ought*, which relates to a set of rules and beliefs that make up a morally approved and disapproved conduct. In essence, descriptive norms state what actions are taken and injunctive norms state what ought or should be done. The authors went on to concede the fact that while norms are said to characterize and guide behavior within a society, they are not a ubiquitous force that dictates behavior at all times in all situations. This means that norms should motivate behavior largely when they are activated; therefore people that are focused on the normative behavior are most like to act in norm-consistent manners. Cialdini et al.'s research concluded that in order for normative theory to effectively be used in a predictive manner, the type of norm that is being used, descriptive or injunctive, must be specified and the various conditions that would make people focus attention on or away from the norm. Although these results came from research the authors conducted that exposed subjects to acute situational conditions they designed that would force their subjects' attention to or away from particular

norms, the authors still find great impact within these results that support the normative theory (Cialdini et al. 1990).

Attitudes and norms differ in a number of ways making them highly distinguishable. For instance, normative theory sheds light on publicly accepted policies an can help explain the reasons behind whether or not management policies are viewed in a positive light (Wittmann et al. 1998). This allows studies to "(1) define standards for management actions, (2) identify situations about which people feel strongly, and (3) indicate the degree of consensus among various interest groups" (Zinn et al. 1998:650). Anderson (2007) differentiated norms from attitudes by stating that attitudes measure "good" or "bad", norms are powerful as they define "what should be".

It is these characteristics of norms and their proven history that makes them so applicable to this study. Normative theory has been used in attempts to define crowding issues in outdoor recreation (Shelby 1981, Ditton et al. 1983, Heberlein et al. 1986, Vaske et al. 1986, Patterson and Hammitt 1990, Williams et al. 1991, Manning et al. 1996, Tarrant 1999, Vaske and Donnelly, 2002). Norms have also been used in other studies to describe recycling behavior (Cialdini et al. 1990; Bratt 1992), the public's acceptability of lethal actions towards problem urban wildlife (Wittmann et al. 1998), and establishing management practices in recreational settings (Vaske et al. 1993).

Normative theory was spearheaded by Jackson in 1965 in the field of sociology, and the theory has been used in a number of studies since then. Jackson's seminal work analyzed norms to build a model for analysis and measurement of norms. The author described a norm as a dimension of behavior in that the norm is always about something (known as an "object"). The object is defined as some act or behavior that is deemed appropriate or inappropriate in a given

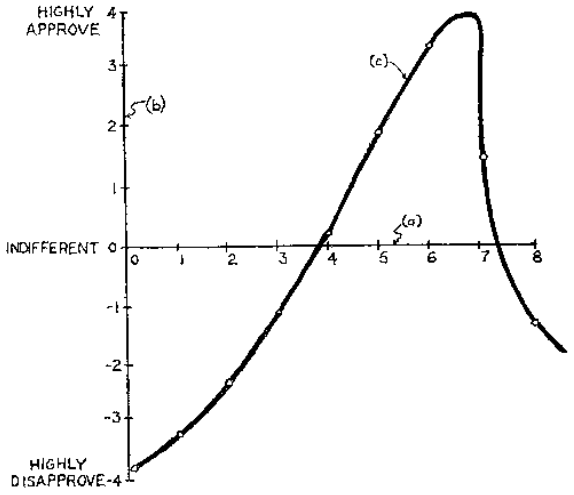
situation, which leads to the behavior dimension of the model. The dimension of evaluation comes into play in that evaluation of a norm is nearly always existent whether it is implicit or explicit. The normative evaluation of a behavior can vary from strong approval to strong disapproval with indifference being in the middle of the continuum (Jackson 1965).

The conceptual and measurement model for norms and roles was developed by Jay Jackson in 1965, and he continued the work in 1966. Jackson developed this model under the guise of defining a role in terms of an individual's (defined as an "Actor") prescriptions for behavior. The multidimensionality of behavior confronts the Actor with expectations for many types of behaviors, which the Actor must integrate into a system. By defining the term *role* in terms of *norms*, it is now possible to break down the components of a role. This led Jackson to the development of the *Return Potential Model* that defined *norm* in terms of the distribution of potential approval and disapproval by Others for alternatives of Actor's behavior along a continuum under certain conditions in a defined situation (Jackson 1966).

As seen in Figure 2.1, this model involves two right angles (X and Y Axes), which are explained with the *behavior* dimension on the horizontal axis and a *potential return dimension* along the vertical axis. Afterwards, a *return potential curve* was drawn for illustrative purposes of a hypothetical distribution of potential approval-disapproval, or return, for a specified behavior dimension in a defined situation. The *point of maximum potential return*, the highest point on the curve, represents the ideal behavior given by the members of a society (commonly known as a *norm*). This model provides a way to measure the amount of agreement in norms and roles (Jackson 1966).

Figure 2.1

Schematic Diagram of Return Potential Model for Representing Norms



(a) A *Behavior Dimension*; (b) A *Return Potential Dimension*; (c) A *Return Potential Curve Source: Jackson, 1966*

With these two elements defined, it becomes possible to evaluate a range of tolerable behavior, which is displayed by the norm curve. It can be defined as the part of the behavior dimension that members of the group approve. Also, the intensity of the norm is displayed by the height of the return potential curve above and below the point of indifference. This represents the amount of intensity of approval or disapproval of the norm. This model displays the crystallization of the norm or the extent to which people agree with the norm as well. When crystallization is high and intensity is low, group members do put much importance in the behavior dimension, and when crystallization is low, there are multiple possible interpretations of the norm (Jackson 1965).

Reno et al. (1993) further tested the theory, and came up with a set of four conclusions. First, they found that the data they collected on normative explanations was substantial in

supporting social norms as a powerful command of behavior even though prior researchers were skeptical of this claim. Second, they concluded there are at least two distinct types of social norms: descriptive and injunctive. Third, unlike descriptive norms, injunctive norms can induce pro-social action in situations that can be classified as antisocial behavior. Lastly, whereas injunctive norms may occur to individuals who are not in groups, they found that descriptive norms seem to only influence the behavior of people in impromptu circumstances, where others may be paying attention to them.

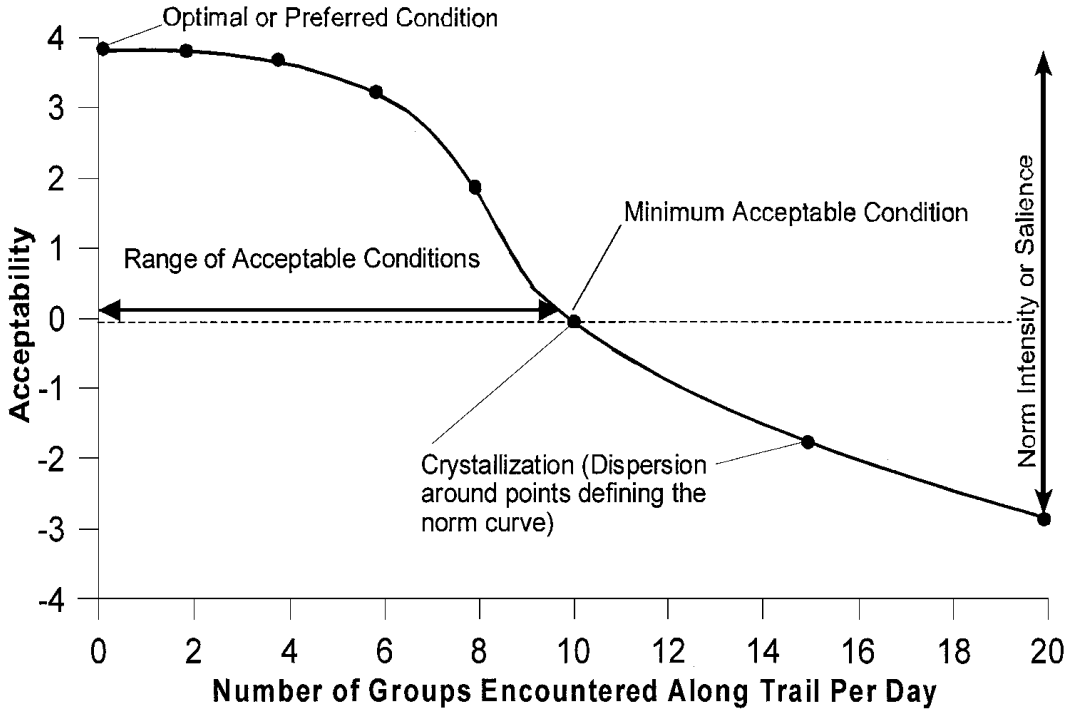
Vaske et al. (1993) summarized studies implemented the use of norm curves with the goal of providing high-quality recreation opportunities and found that research information about norms is one useful component of a more informed decision environment. The authors go on to state that the norm curve model is appealing as it is straightforward and moves from the individual level to the aggregate in a manner that is both empirical and traceable. The concluding remarks determined that the usefulness of normative approaches comes from their ability to characterize group agreement about appropriate use conditions or impact levels for a specific recreation experience, which provides the necessary amount of evaluative information needed to establish management standards.

Manning et al. (1999:99) studied the use of norm curves to explain crowding-related standards of quality. As shown in Figure 2, the norm curve displays the mean acceptability ratings of a sample group of recreationalists in terms of encountering a range of groups on the trail in a given day. The highest point on the norm curve displays the optimal or preferred condition, and the range of acceptable conditions includes all points above the x-axis with the minimum acceptability condition being the part of the curve that lies on the x-axis. The term crystallization is used to define the amount of agreement among the sample, and is indicated by

the variance of individual responses around the means of the norm curve. Lastly, the terms intensity and salience appear as they measure the degree to which the impact of study is important to the respondents by taking the distance of the norm curve above or below the zero point of the acceptability scale (Manning et al. 1999). As shown in the studies described above, the use of norm curves can have a wide range of functions.

Figure 2.2

Hypothetical social norm curve



Source: Manning et al. 1999

Similar to Manning et al. (1999), Heywood (2002) described the normative process as researchers asking respondents to quantify their range of preferable or acceptable contacts during

a specific point in time. Their preferences are then put together to identify social standards, which are classified as normative if and only if they have crystallized and have strong intensity.

Another essential norm concept is obligations and sanctions. Obligations prescribe behavior or define how individuals should behave and proscribe behavior or define how individuals should never behave (Heywood 1996; Heywood and Aas 1999). Obligations are able to affect behavior when the prescriptions and proscriptions are internalized and result in sanctions when they are violated. Sanctions are defined as rewards or punishments for behaviors and can be classified into two categories. Informal sanctions happen between individuals that are interacting with one another and come in the forms of either approving or disapproving glances, laughs, and silences while formal sanctions include external agents that enforce rules that can result in receiving anything from an honorary dinner or medal to going to jail or the electric chair (Heywood and Aas 1999).

Self-sanctions occur since obligations to conform to the social norm are internalized, which means that informal and formal sanctions are external, and self-sanctions are internal. Internal self-sanctions derive from the individual's knowledge of how well their behavior conforms to a norm. Self-punishment can result from self-sanctioning, and manifest itself through feelings anywhere from embarrassment, anxiety, guilt, shame, self-depreciation, and loss of self-esteem to pride, increased self-esteem, and security (Heywood and Aas 1999). Internal sanctions are discovered by asking respondents if they would feel uneasy or comfortable, embarrassed or guilty, ashamed or proud, guilty or guiltless for either abiding by or disobeying the obligation (Heywood 2000). While the social conditions leading to the formation of norms have been extensively studied, sanctions due to norm deviation have not (Roggenbuck et al. 1991; Heywood 1996; Heywood and Aas 1999). Roggenbuck et al. (1991) were especially

critical of normative theory in general and called for more research to be done on obligations and sanctions. Shelby et al. (1996:117) accepted that sanctions are effective at controlling behaviors such as littering or vandalism because the individual controls those actions. However, they go on to state that sanctioning mechanisms are less clear when it comes to the collective behavior of groups because they are not breaking any rules.

Heywood and Aas (1999) studied cross-country skiing with dogs in Norway to test the connection between obligations to control dogs and self-sanctions for not controlling dogs, and encounter preferences for meeting leashed and unleashed dogs. Results conclude that while encountering dogs on ski tracks was not seen as a problem by a majority of respondents, there was strong support for a social obligation to control dogs, and most respondents indicated that losing control of a dog would result in feelings of uneasiness, guilt, shame, and embarrassment. However, the study failed to find a link between a behavior norm and a social condition norm in that there were very weak social condition norms for a preferred number of encounters with leashed and unleashed dogs.

Normative theory has also been used to study snorkeling on the Florida Keys. Loomis et al. (2008) studied social norms between snorkelers on coral reefs and found that norms exist. For instance, respondents felt that snorkelers had '*a strong obligation to never …break off pieces of live coral*', demonstrating that the snorkelers hold value in the reefs and will go so far as confronting others to protect it. This study also found that behavioral norms for the inherent value of the reef was shown by the respondents indicating high embarrassment levels for partaking in actions such as '*knowingly anchoring a boat on coral*' and '*breaking off pieces of live coral*'. A 7-point Likert scale was used to ascertain the extent that respondents felt obligated

to certain behaviors (Table 2.1) and to assess the snorkelers' potential embarrassment if they were observed participating in certain behaviors (Table 2.2).

Table 2.1. Obligation Survey Question

Please indicate the extent to which you believe all snorkelers/SCUBA divers have an obligation either to do or not to do each of the following on a coral reef.[1]
a. Maintain buoyancy control
b. Tell others not to touch corals
c. Operate boats in shallow reef areas
d. Feed fish
e. Swim close to marine mammals
f. Touch marine mammals
g. Pick up garbage from the sea floor
h. Operate boats at least 100 feet from a dive flag
i. Take pieces of dead coral
j. Break off pieces of live coral
k. Leave shells in original locations on a reef
l. Tell others not to anchor boats on coral

[1] Obligations coded on a 7-point scale (1=strong obligation to never do, 0=no obligation, 6=strong obligation to do)

Table 2.2. Embarrassment survey question

Imagine that you did the following at a coral reef and others saw you. How embarrassed would you feel?[1]
a. Lost buoyancy control
b. Touched corals with your hands
c. Operated a boat in a shallow reef area
d. Fed fish
e. Swam close to marine mammals
f. Touched marine mammals
g. Left garbage on the sea floor
h. Operated a boat too close to a dive flag
i. Took pieces of dead coral
j. Broke off pieces of live coral
k. Removed shells from a reef
l. Knowingly anchored a boat on coral

[1] Obligations coded on a 7-point scale (1=strong obligation to never do, 0=no obligation, 7=strong obligation to do)

This study shows the possibility for scuba divers on shipwrecks to have their own set of social norms, which this study aims to uncover. As previously mentioned, crystallization is the measure of the extent of agreement among the sample regarding a particular action (Jackson 1965; Manning et al. 1999). The only instances when social norms prove useful in creating management standards are when there is a consensus among personal norms (Shelby and Vaske 1991). However, calculating and conceptualizing crystallization using the statistical methods that were originally developed could be too challenging for someone not trained in statistics. For this reason, Manfredo et al. (2003) developed the Potential for Conflict Index (PCI) and an accompanying graphic representation of the statistical measures that display the findings as the potential for conflict over the acceptability of a given management action. This allows for a much easier understanding and interpretation of statistical information (Manfredo et al. 2003; Vaske et al. 2006).

Vaske et al. (2010) refined the PCI and developed the PCI_2 in order to convey a more accurate degree of crystallization using methods that are described in depth in their article. The PCI_2 ranges from 0 to 1 to define the amount of consensus. The least amount of consensus and greatest potential for conflict (PCI_2=1) happens when respondents evenly select extreme values on a response scale; for instance, 50% select extremely acceptable while 50% select extremely unacceptable. Conversely, a distribution with 100% at any one point on the response scale produces a PCI_2 of 0, and suggests complete consensus with no potential for conflict (Vaske et al. 2013:72).

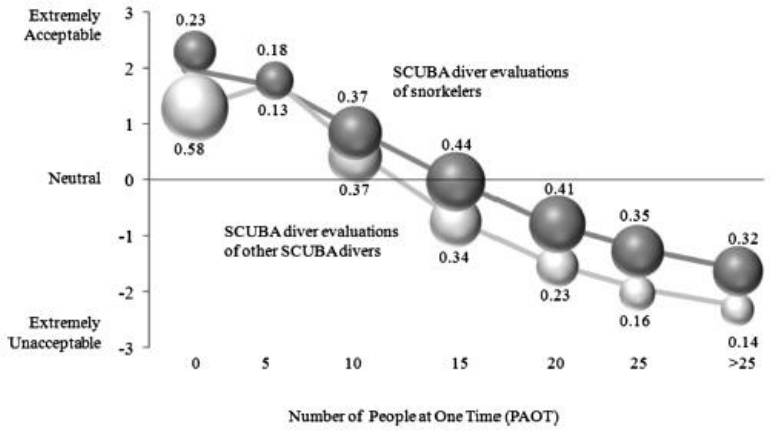
Once the PCI_2 results are tabulated, they can be displayed using bubbles of different sizes on a graph. The size of the bubbles represent the degree of consensus by representing the value of the PCI_2. The bubble is smallest when PCI_2=0 and the consensus is highest. The size of the

bubble continues to grow until PCI_2=1 and the potential for conflict is highest. The center of the bubble denotes the mean responses from the survey, which are plotted along the vertical axis to form a curve similar to that of a social norm curve (Vaske et al. 2013:72).

Vaske et al. (2013) used PCI_2 to convey the differences in normative tolerances for different amount of people at one time (PAOT) within and between scuba divers and snorkelers. Data was used from the Florida Keys region that evaluated scuba divers' and snorkelers' encounter norms for seeing 0, 5, 10, 15, 20, 25, and >25 scuba divers/snorkelers at one time on scales ranging from "extremely acceptable" to "extremely unacceptable". The chart below (Figure 3) displays results of the acceptability of scuba divers seeing a range of other scuba divers and snorkelers at one time using PCI_2. Under this method it becomes instantly clear which number of scuba divers and snorkelers is most acceptable and how much crystallization there is in respondents for each question.

Figure 2.3

Mean acceptance rating and Potential for Conflict Index$_2$



PCI_2 values for scuba diver evaluations of scuba divers (light bubbles) and snorkelers (dark bubbles) at seven levels of people at one time. Numbers above and below the bubbles are the PCI_2 values. PCI_2 difference (*d*) tests comparing the evaluations of scuba divers and snorkelers at one time were statistically significant ($p<0.05$) for 0, 15, 20, 25, and >25 PAOT (Vaske et al. 2013).

Learning from previous studies that utilize *normative theory*, the author's study of scuba divers attitudes to sustainable shipwreck diving in North Carolina aims to use survey questions regarding embarrassment and obligation similar to Loomis et al. (2008) and display the results using PCI_2 as Vaske et al. (2013) did. In lieu of sanctions for divers on coral reefs, this study seeks to find sanctions of divers on shipwrecks and compare them with sustainable actions to find out whether or not NC divers are engaging in sustainable diving practices.

Chapter 3: Methods

This study was approved by East Carolina University's University & Medical Center Institutional Review Board Office as an exempt study with the permit number UMCIRB 14-000869 (Appendix A). This study surveyed a sample of NC shipwreck scuba divers. The survey instrument within this study was designed to determine how a sample of NC shipwreck divers defined sustainable behaviors on shipwrecks. To distribute the sample, emails were sent out to a mailing list of NC dive shops (Appendix B). The survey asked a series of questions based on how the literature defined sustainable diving behaviors. Afterwards, divers were asked how acceptable such actions seemed to them in order to determine whether they defined sustainable actions in the same manner as the literature.

3.1 Description of Sample

The population for this study was comprised of individuals who dive on shipwrecks in North Carolina, both NC residents and visitors to the state. The divers had varying levels of experience and training. The survey was created on SurveyMonkey, and a link to the survey was distributed to email addresses in two phases. The first phase involved distribution of the link to groups internal, or connected to, East Carolina University, including:

- The email list of scientific scuba divers maintained by ECU's Diving and Water Safety Office
- The email list of recreational scuba divers maintained by ECU's Department of Kinesology

- The email list of scientific divers maintained by individual academic units and programs of ECU (e.g. Maritime Studies, Coastal Studies, Coastal Resources Management, Geological Sciences, and Biology)
- The listserv of the North Carolina Nautical Archaeology Society (avocational maritime archaeology initiative) listserv maintained by Dr. Nathan Richards at the UNC-Coastal Studies Institute

During the second phase, contact was made with dive shops, businesses, and charter operators in North Carolina, of which 100 were identified across the state (see http://nc-wreckdiving.com/shops.html, Appendix B). Once the shops were initially contacted about distributing the survey, shops that responded negatively were discarded from study. Afterwards, a rapport was built with dive shop owners across the state that did not reply to the original emails sent out. This was done by talking with them over the phone and getting them more familiar with the survey in hopes they would then distribute it to their email lists. Then, a reminder email was sent one week later to the dive shops (Appendix C). With over 100 dive shops in the state, if only two responses were given per dive shop, a sample size of over 200 could be attained. A snowballing effect was created by sending the survey link out to diving communities via email and asking each recipient to pass the link on to other NC divers (the survey requests that only *shipwreck divers* complete the survey). This was done to include those divers who do not go through dive shops. The survey was available from July 11, 2014 to August 11, 2014.

3.2 Survey Development and Distribution

The survey instrument used (Appendix D) was partially based on a survey previously developed and tested on scuba divers and snorkelers (Appendix E; Loomis et al. 2008). While

this instrument was used as a foundation for the current study, the items on the scale were refined based on the aforementioned literature, and questions were augmented to reflect shipwreck diving. A summary how the survey instrument addressed the research questions is depicted in Table 3.1.

Table 3.1. Survey Questions and Corresponding Analyses

Section	Survey Questions	Response options	Analyses Type	RQ
1	Consent form			
2	Qualifier to take the survey			
3	Diving Experience	Multiple Types	T-Test, ANOVA	3
4	Shipwreck Access and Boating	7 Point Likert Type Scale	T-Test, ANOVA	1, 2
5	Treatment of Shipwreck Structures	7 Point Likert Type Scale	T-Test, ANOVA	1, 2
6	Treatment of Shipwreck Features	7 Point Likert Type Scale	T-Test, ANOVA	1, 2
7	Treatment of Surface Artifacts	7 Point Likert Type Scale	T-Test, ANOVA	1,2
8	Treatment of Buried Artifacts	7 Point Likert Type Scale	T-Test, ANOVA, Norm Curve	1,2
9	Penetration of Wrecks	7 Point Likert Type Scale	T-Test, ANOVA	1, 2
10	Demographics	Multiple Types	T-Test, ANOVA	3

The first section completed on the survey was a consent form. The second section was a question that ensured that all survey respondents did indeed have experience diving on shipwrecks in North Carolina. The third and tenth sections of the survey helped answer the third research question - "What is the role of geographical origin, level and training and experience, gender, and other demographic variables in determining diver attitudes to their shipwreck diving practices?". The third section collected data on geographic origin (zip code), recreational diving certification, scientific diving certification, commercial diving certification, whether or not the respondent considered themselves a regular at a dive shop, the zip code of the dive shop, number of years diving on shipwrecks, number of dives on shipwrecks within the past five years, and

whether or not they were a part of a maritime history or archaeological group. The fourth section sought to assess divers' attitudes on sustainable diving practices (research question two). There were four questions asked in this section to align responses of this question on a norm curve. Most importantly, this section gauged which anchoring practices were deemed acceptable by respondents, an important topic because anchors can cause damage to shipwrecks (Edney 2006).

The fifth section attempted to assess divers' attitudes on shipwreck structures and their context (research question two). This section asked five questions related to damaging and exposing the shipwreck structure. Actions included in this section were: incorrect weighting, incorrect finning, vandalizing the shipwreck structure, exposing the shipwreck structure by digging, and collecting apart of the shipwreck structure itself.

The sixth section addressed divers' attitudes on shipwreck features such as port holes and engines. This section asked five questions related to damaging and exposing the shipwreck feature. Actions included in this section were: incorrect weighting, incorrect finning, vandalizing the shipwreck feature, exposing the shipwreck feature by digging, and collecting a shipwreck feature itself. The statistical analysis of this section included a norm curve based on norm theory discussed in Chapter 2.

The seventh and eighth sections included questions about artifact disturbance and collection. The seventh section addressed the fourth part of the second research question about divers' attitudes on surface artifacts such as those that lie unburied and uncovered), while the eighth section attempted to answer the fifth part of the second research question about divers' attitudes on buried artifacts such as those that lie mostly beneath sediments. Both sections asked twelve questions related to the treatment of artifacts. It was the aim of these sections to provide

a precise depiction of divers' attitudes towards the disturbance and collection of surface and buried artifacts alike. To be able to portray such attitudes in detail, section seven gauged the acceptability of the dislodgement or disturbance, handling and returning, moving, and collection and removal of artifacts. These four actions were asked about artifacts inside of, adjacent to, and away from the shipwreck.

Section eight gauged the acceptability of the exposal of artifacts through the disturbance of sediments inside of, adjacent to, and away from the shipwreck, the excavation, handling and returning of artifacts from inside of, adjacent to, and away from the shipwreck to the same location and a new location, and the collection and removal of artifacts inside of, adjacent to, and away from the shipwreck. Section eight included a question that gauged the number of artifacts divers deemed acceptable to witness the collection of during a typical dive. The responses ranged from extremely unacceptable to extremely acceptable with an option for "not sure". The number of artifacts ranged from zero to more than 25 in increments of five. This question was included in order to plot the results on a norm curve in order to determine whether or not there is a strong consensus among shipwreck divers regarding the appropriateness of artifact collection. PCI_2 was used to clearly and accurately present the results of this question.

The response choices (extremely unacceptable, very unacceptable, somewhat unacceptable, not sure, somewhat acceptable, very acceptable, and extremely acceptable) were used to graph out the acceptability of diving behaviors to plot on a norm curve using Microsoft *Excel* workbook (*Potential Conflict Index version 2.0)* by Jerry Vaske (downloaded from http://warnercnr.colostate.edu/~jerryv/PCI2/excel.htm). This portrayed an accurate picture of divers' attitudes in relation to sustainable practices by gauging divers' acceptability of behaviors classically defined as being harmful to shipwrecks.

Previous research has noted that a six-point scale has high reliability and is suitable for research, and that six is not enough to overwhelm the participant with too many response choices (Green and Rao 1970; Chomeya 2010). Additionally, the previous instrument from Loomis et al. (2008) was on a six-point scale, so consistency was kept.

The ninth section addressed the penetration of wrecks by scuba divers. This section asked three questions related to divers penetrating the shipwreck. Actions included in this section were: the general penetration of the shipwreck, the penetration of the shipwreck on open-circuit scuba, and the penetration of the shipwreck on closed-circuit scuba.

Sections four through nine of the survey instrument asked the participant to rate the level of acceptability of individual actions deemed detrimental to the sustainability of shipwrecks from Muckelroy (1978), Stone (1996), McCarthy (2000), Edney (2006), and NAUI (2013b) (see Table 3.2). Furthermore, these questions compared the attitudes of respondents with the CRM theory that states *in situ* is the best method of preservation (UNESCO 2007).

Table 3.2 Items Added to or Changed from Previous Instrument

Category of Sustainable Action	Item	Reference
Shipwreck Access and Boating	Anchoring directly to the shipwreck	Edney 2006
Treatment of Shipwreck Structures	Incorrect weighting cause contact with wreck	Edney 2006
	Incorrect finning cause contact with wreck	NAUI 2013b
Treatment of Shipwreck Features	Exposing the hull of the ship by digging	McCarthy 2000
	Removing artifacts	Edney 2006
Treatment of Surface Artifacts	Dislodge or disturb objects while searching for artifacts	Edney 2006
	Collecting artifacts scattered away from the frame of the ship	Edney 2006
Treatment of Buried Artifacts	Collecting artifacts located near the frame of the ship	Muckelroy 1978
	Handling artifacts	Edney 2006
Penetration of Wrecks	Leaving exhaled air bubble from penetration wrecks	Edney 2006

The tenth (final) section sought to gain information about the demographics of the respondents. These variables were included to compare crystallization amongst various groups of divers and to help answer the third research question. For this section, the statistical analyses that were ran consisted of analyses of variance and t-tests. For the questions on age, education level, employment status, income, and experience diving on shipwrecks an analysis of variance was ran against the variables in Table 3.3. For the questions on working with a maritime history or archaeological group, gender, and being a regular at a dive shop a t-test was ran against the variables in Table 3.3. The instrument was piloted and reviewed by an expert panel including faculty and staff at East Carolina University and staff at NOAA's Monitor National Marine Sanctuary (see Table 3.4).

Table 3.3. Sustainable Action Variables

Sustainable actions
It is okay to anchor on or in shipwreck structure.
It is okay to anchor on sediment adjacent to a shipwreck.
Only diving on a shipwreck with a mooring buoy or established anchor point is okay.
Only live-boating (no anchor) when no other alternative is available is okay.
It is okay to accidentally damage shipwreck structure (e.g. due to incorrect weighting).
It is okay to accidentally expose shipwreck structure (e.g. due to incorrect finning).
It is okay to deliberately damage shipwreck structure (e.g. vandalism).
It is okay to deliberately expose shipwreck structure (e.g. digging).
It is okay to deliberately remove shipwreck structure (e.g. collection).
It is okay to accidentally damage a shipwreck feature (e.g. due to incorrect weighting).
It is okay to accidentally expose a shipwreck feature (e.g. incorrect finning).
It is okay to deliberately damage a shipwreck feature (e.g. vandalism).
It is okay to deliberately expose a shipwreck feature (e.g. digging).
It is okay to deliberately remove a shipwreck feature (e.g. collection).
It is okay to accidentally dislodge or disturb artifacts inside a shipwreck (no handling).
It is okay to accidentally dislodge or disturb artifacts adjacent to a shipwreck.
It is okay to accidentally dislodge or disturb artifacts away from a shipwreck (i.e. in debris field).
It is okay to handle and return artifacts from inside a shipwreck to its same location.
It is okay to handle and return artifacts from adjacent a shipwreck to its same location.
It is okay to handle and return artifacts from outside a shipwreck to its same location.
It is okay to move artifacts from inside a wreck to a new location.
It is okay to move artifacts adjacent to a wreck to a new location.
It is okay to move artifacts away from a wreck to a new location.
It is okay to collect and remove artifacts from inside shipwreck.
It is okay to collect and remove artifacts adjacent to a shipwreck.
It is okay to collect and remove artifacts away from a shipwreck.
It is okay to accidentally disturb sediments inside a shipwreck, exposing artifacts.
It is okay to accidentally disturb sediments adjacent to a shipwreck, exposing artifacts.
It is okay to accidentally disturb sediments away from a shipwreck, exposing artifacts.
It is okay to excavate, handle, and return artifacts from inside a shipwreck to its same location.
It is okay to excavate, handle, and return artifacts from adjacent a shipwreck to its same location.
It is okay to excavate, handle, and return artifacts from away a shipwreck to its same location.
It is okay to excavate, handle, and return artifacts from inside shipwreck to a new location.
It is okay to excavate, handle, and return artifacts from adjacent shipwreck to new location.
It is okay to excavate, handle, and return artifacts from away from shipwreck to new location.
It is okay to collect and remove artifacts from inside shipwreck.
It is okay to collect and remove artifacts adjacent to a shipwreck.
It is okay to collect and remove artifacts away from a shipwreck.
It is okay to penetrate a shipwreck.
It is okay to penetrate a wreck on open-circuit scuba (exhaled air accumulates inside wreck).
It is okay to penetrate a wreck on closed-circuit rebreather (little to no air accumulates inside wreck).

Table 3.4. Expert Panel

Name	Title
Lauren Heesemann	Research Coordinator, Monitor National Marine Sanctuary
Joseph Hoyt	Maritime Archaeologist, Monitor National Marine Sanctuary
Mark Keusenkothen	Director of Diving and Water Safety, East Carolina University
Dr. Patrick Long	Director, East Carolina University Center for Sustainability
Dr. Calvin Mires	Staff Archaeologist, Program in Maritime Studies, East Carolina University
Jason Nunn	Diving Safety Officer, East Carolina University

Chapter 4: Results

4.1 Introduction

The goal of this study was to get a better understanding of how NC shipwreck divers define sustainable activities. The basis of this study was determining how the literature has defined sustainable shipwreck diving activities and compare that to how the study sample defines them. This chapter lays out the results of the study. This section first goes over the results of the descriptive statistics and then the results of the statistical analyses of the study.

4.2 Descriptive Results of Diver Profiles and Sustainable Action Attitudes

In just over four weeks of data collection, 89 usable responses were amassed. As the survey was sent out through dive shops, the author cannot determine a response rate. Most of the respondents were men (71.3%) and between the ages of 51-60 (31.3%) or 18-30 (27.5%) (Table 4.1). The largest portions of the sample had a total household income of $1,000-$49,999 (29.2%) and $50,000-$99,000 (27.8%). The respondents were predominately white (92.5%) and most had a bachelor's degree (46.2%) or a graduate degree (29.5%) (Table 4.1). The most cited occupational categories were evenly split between the public sector and private sector (24.4% each), followed by students (20.5%) (Table 4.2).

Table 4.1. Socio-demographic Profile of Participants

Variable	Percentage of Respondents (n=88)
Gender	
Male	71.3%
Female	28.7%
Missing responses	9
Age Range	
18-30	27.5%
31-40	15%
41-50	18.8%
51-60	31.3%
61-70	6.3%
71+	1.3%
Missing responses	9
Household Income	
$1,000-$49,000	29.2%
$50,000-$99,000	27.8%
$100,000-$149,000	19.4%
$150,000-$199,000	11.1%
$200,000-$249,000	2.8%
Over $250,000	9.7%
Missing responses	17
Race/Ethnicity	
Caucasian or White	92.5%
American Indian or Alaska Native	2.5%
Hispanic, Latino, or Spanish Origin	1.3%
Asian	1.3%
Other	2.5%
Missing responses	9
Education Level	
Some college/Associate's degree	15.4%
Professional/Trade degree	5.1%
Bachelor's degree	46.2%
Graduate degree	29.5%
MD/JD	3.8%
Missing responses	11

Table 4.2. Occupation of Respondents

Occupational Category	Percentage of Respondents (n=78)
Employed in the private sector	24.4%
Employed in the public sector	24.4%
Student	20.5%
Self-employed	12.8%
Retired	12.8%
Employed in the non-profit sector	5.1%
Missing responses	11

Respondents were from thirteen states and the District of Columbia, however North Carolina was the top represented with 56.8% of the sample, followed by Virginia with 19.3%. Most of the North Carolina residents (22.7%) live in Greenville.

Respondents were asked about their diving certification. Respondents indicated they had recreational diver certification through PADI (66.3%) or NAUI (46.1%). Divers holding additional scientific certifications through the American Academy of Underwater Sciences (AAUS) accounted for 27% of respondents (only 3.4% of selected alternative scientific diver certification). Only one respondent said they held a commercial diving certification (Table 4.3).

Table 4.3. Diver Certification Agencies

Recreational Diver Certification Agency	**Percentage of Responses**
PADI	66.3%
NAUI	46.1%
SSI	27%
SDI	11.2%
Other	14.6%
Scientific Diver Certification Agency	**Percentage of Responses**
AAUS	27%
Commercial Diver Certification	1.1%
Other	3.4%

Note: As respondents could select more than one answer, percentages may not add to100%.

Participants were asked whether or not they considered themselves regulars at dive shops, and if they selected yes, they were asked for the zip code of their dive shop. Of the respondents, most (77.3%) said they were regulars at dive shops, and of these respondents, most (57.4%) were regulars of dive shops *in North Carolina*. The most common responses were dive shops in the Greenville, NC area (18) and in Beaufort, NC (8). The second most selected state was Virginia (19.1%).

Respondents were then asked how many total years of experience they have diving on shipwrecks and how many times they have been diving on shipwrecks in the past five years.

When asked about the number of years they have been diving on shipwrecks, responses ranged from zero to 51. The average totaled to be 13.6 years with a median response of 10 years. The most frequent response was eight years. Levels of experience were broken into five different groups, 0-10 years (n=48, or 55.2%), 11-20 years (n=21, or 24.1%), 21-30 years (n=10, or 11.5%), 31-40 years (n=6, or 6.9%), and more than 40 years (n=2, or 2.3%).

When asked how many times respondents have been diving on shipwrecks within the past five years, responses ranged from zero to 500. The average number of dives was 92.3 and the median number of dives was 40. The most frequent response was 10 dives within the past five years.

Participants were then asked whether they belong to a maritime history or archaeological group. In total, 22.7% of respondents said they did belong to a maritime history or archaeological group and 77.3% said they did not belong to such group.

Respondents were polarized when asked about *anchoring to a shipwreck structure*; around half (52.2%) said it was at least somewhat unacceptable and almost half (43.1%) said it was at least somewhat acceptable. *Anchoring to sediment* was deemed much more acceptable by respondents as 67.1% said it was at least somewhat acceptable. *Exclusively diving on a shipwreck with a mooring buoy* and *using only live-boating* was deemed less acceptable as 57.9% and 50.0% of respondents said these actions were at least somewhat acceptable respectively (Table 4.4).

Table 4.4. Actions Regarding Shipwreck Access and Boating by Divers (n=88)

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA
It is okay to anchor on or in shipwreck structure ($\overline{x}$=14.26%)	19.30%	19.30%	13.60%	4.50%	13.60%	17.00%	12.50%
It is okay to anchor on sediment adjacent to a shipwreck($\overline{x}$=14.31%)	8.00%	8.00%	9.10%	8.00%	20.50%	25.00%	21.60%
Only diving on a shipwreck with a mooring buoy or established anchor point is okay ($\overline{x}$=14.29%)	15.90%	11.40%	5.70%	9.10%	13.60%	19.30%	25.00%
Only live-boating (no anchor) when no other alternative is available is okay ($\overline{x}$=14.29%)	20.50%	6.80%	5.70%	17.00%	19.30%	12.50%	18.20%

Note: EU= Extremely unacceptable, VU= Very unacceptable, SU= Somewhat unacceptable, SA= Somewhat acceptable, VA= Very acceptable, and EA= Extremely acceptable

Additionally, respondents generally agreed that *deliberately* damaging shipwreck structures is extremely unacceptable (81.4%) (Table 4.5). Over half of respondents cited *deliberately* exposing shipwreck structures (51.2%) and *deliberately* removing shipwreck structures (57.0%) were extremely unacceptable. *Accidentally* damaging and exposing shipwreck structures were cited as more acceptable than *deliberately* damaging shipwreck structures. This is evidenced by 79.0% of participants citing that *accidentally* damaging shipwreck structures is at least somewhat unacceptable and 71.0% citing that *accidentally* exposing shipwreck structures is at least somewhat unacceptable. By saying that these actions are at least somewhat unacceptable, respondents are indicating that *accidently* damaging the shipwreck structure is more acceptable than *deliberately* damaging the structure.

Table 4.5. Actions Regarding the Treatment of Shipwreck Structures by Divers (n=86)

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA
It is okay to accidentally damage shipwreck structure (e.g. due to incorrect weighting) ($\overline{x}$=14.29%)	30.20%	33.70%	15.10%	3.50%	10.50%	3.50%	3.50%
It is okay to accidentally expose shipwreck structure (e.g. due to incorrect finning) ($\overline{x}$=14.30%)	25.60%	25.60%	19.80%	7.00%	11.60%	7.00%	3.50%
It is okay to deliberately damage shipwreck structure (e.g. vandalism) ($\overline{x}$=14.31%)	81.40%	4.70%	1.20%	4.70%	2.30%	1.20%	4.70%
It is okay to deliberately expose shipwreck structure (e.g. digging) ($\overline{x}$=14.29%)	51.20%	10.50%	9.30%	5.80%	8.10%	5.80%	9.30%
It is okay to deliberately remove shipwreck structure (e.g. collection) ($\overline{x}$=14.29%)	57.00%	12.80%	5.80%	3.50%	9.30%	2.30%	9.30%

Note: EU= Extremely unacceptable, VU= Very unacceptable, SU= Somewhat unacceptable, SA= Somewhat acceptable, VA= Very acceptable, and EA= Extremely acceptable

When asked about the treatment of shipwreck features, respondents generally agreed that *deliberately* damaging shipwreck features is extremely unacceptable (75.0%). Almost half of respondents cited *deliberately* exposing shipwreck features (47.7%) and over half said *deliberately* removing shipwreck features (59.1%) were extremely unacceptable. *Accidentally* damaging and exposing shipwreck features were cited as less unacceptable as 77.0% said that *accidentally* damaging shipwreck features is at least somewhat unacceptable and 73.8% said that *accidentally* exposing shipwreck features is at least somewhat unacceptable (Table 4.6).

Table 4.6. Actions Regarding the Treatment of Shipwreck Features by Divers

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA	n
It is okay to accidentally damage a shipwreck feature (e.g. due to incorrect weighting)	28.70%	29.90%	18.40%	5.70%	8.00%	6.90%	2.30%	87
It is okay to accidentally expose a shipwreck feature (e.g. incorrect finning)	26.10%	21.60%	26.10%	5.70%	11.40%	6.80%	2.30%	88
It is okay to deliberately damage a shipwreck feature (e.g. vandalism)	75.00%	6.80%	4.50%	8.00%	1.10%	1.10%	3.40%	88
It is okay to deliberately expose a shipwreck feature (e.g. digging)	47.70%	15.90%	8.00%	5.70%	9.10%	5.70%	8.00%	88
It is okay to deliberately remove a shipwreck feature (e.g. collection)	59.10%	6.80%	5.70%	9.10%	6.80%	4.50%	8.00%	88

Note: EU= Extremely unacceptable, VU= Very unacceptable, SU= Somewhat unacceptable, SA= Somewhat acceptable, VA= Very acceptable, and EA= Extremely acceptable

When surveyed about the treatment of surface artifacts nearly half to just over half of respondents said that *moving artifacts from one place to another* was extremely unacceptable no matter where the artifact was or where it was being placed. Half to slightly over half of respondents answered that *collecting and removing artifacts* was extremely unacceptable. Respondents were in less agreement about *handling and returning artifacts* as only around a quarter or respondents said that this was extremely unacceptable no matter where the artifacts were collected from or returned to. *Accidentally* dislodging or disturbing artifacts was ranked about the same as handling and returning them albeit slightly more acceptable (Table 4.7).

Table 4.7. Actions Regarding the Treatment of Surface Artifacts by Divers

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA	n
It is okay to accidentally dislodge or disturb artifacts inside a shipwreck (no handling)	27.90%	23.30%	18.60%	5.80%	11.60%	5.80%	7.00%	86
It is okay to accidentally dislodge or disturb artifacts adjacent to a shipwreck	23.30%	24.40%	15.10%	8.10%	16.30%	5.80%	7.00%	86
It is okay to accidentally dislodge or disturb artifacts away from a shipwreck (i.e. in debris field)	22.10%	22.10%	17.40%	7.00%	14.00%	7.00%	10.50%	86
It is okay to handle and return artifacts from inside a shipwreck to its same location	26.70%	16.30%	12.80%	8.10%	14.00%	8.10%	14.00%	86
It is okay to handle and return artifacts from adjacent a shipwreck to its same location	26.70%	15.10%	9.30%	8.10%	18.60%	7.00%	15.10%	86
It is okay to handle and return artifacts from outside a shipwreck to its same location	24.40%	17.40%	10.50%	8.10%	17.40%	8.10%	14.00%	86
It is okay to move artifacts from inside a wreck to a new location	51.20%	11.60%	10.50%	10.50%	5.80%	2.30%	8.10%	86
It is okay to move artifacts adjacent to a wreck to a new location	48.80%	11.60%	10.50%	10.50%	5.80%	2.30%	10.50%	86
It is okay to move artifacts away from a wreck to a new location	48.80%	12.80%	10.50%	8.10%	7.00%	3.50%	9.30%	86
It is okay to collect and remove artifacts from inside a shipwreck	54.70%	9.30%	4.70%	8.10%	7.00%	4.70%	11.60%	86
It is okay to collect and remove artifacts adjacent to a shipwreck	52.40%	9.50%	8.30%	9.50%	3.60%	6.00%	10.70%	84
It is okay to collect and remove artifacts away from a shipwreck	50.00%	10.50%	7.00%	8.10%	7.00%	4.70%	12.80%	86

Note: EU= Extremely unacceptable, VU= Very unacceptable, SU= Somewhat unacceptable, SA= Somewhat acceptable, VA= Very acceptable, and EA= Extremely acceptable

When asked about the treatment of buried artifacts just under half of respondents said that *excavating and moving artifacts from one place to another* was extremely unacceptable no matter where the artifact was or where it was being placed. Half to slightly over half of respondents answered that *collecting and removing artifacts* was extremely unacceptable. Respondents were in less agreement about *excavating then handling and returning artifacts* as only around a quarter or respondents said that this was extremely unacceptable no matter where the artifacts were excavated from or returned to. *Accidentally* disturbing sediments was deemed more acceptable by divers as less than 15% of respondents cited this as extremely unacceptable on any part of the shipwreck. More detailed results can be seen in Table 4.8.

Respondents were asked about the acceptability of *collecting numbers of artifacts* at a time in intervals of five. Respondents made it clear that the acceptable number of artifacts collected is between zero and five. This is made clear by only 2.4% saying that collecting zero artifacts is extremely unacceptable and 51.2% responded extremely unacceptable to five artifacts being collected. More detailed results can be seen in Table 4.9.

For the last question of descriptive statistics, respondents were asked about the acceptability of the *penetration of wrecks*. Overall, respondents were fairly accepting of penetrating wrecks as 86.9% of respondents said that it was at least somewhat acceptable penetrate wrecks. They were also fairly accepting of allowing *exhaled air to accumulate inside the wreck* and *using a closed-circuit rebreather* so that little to no air accumulates inside of the wreck. More detailed results can be seen in Table 4.10.

Table 4.8. Actions Regarding the Treatment of Buried Artifacts by Divers

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA	n
It is okay to accidentally disturb sediments inside a shipwreck, exposing artifacts	14.60%	23.20%	22.00%	8.50%	14.60%	9.80%	7.30%	82
It is okay to accidentally disturb sediments adjacent to a shipwreck, exposing artifacts	11.10%	23.50%	21.00%	8.60%	18.50%	8.60%	8.60%	81
It is okay to accidentally disturb sediments away from a shipwreck, exposing artifacts	13.60%	17.30%	23.50%	12.30%	17.30%	8.60%	7.40%	81
It is okay to excavate, handle, and return artifacts from inside a shipwreck to its same location	30.90%	16.00%	13.60%	11.10%	12.30%	7.40%	8.60%	81
It is okay to excavate, handle, and return artifacts from adjacent a shipwreck to its same location	28.80%	18.80%	11.30%	11.30%	13.80%	8.80%	7.50%	80
It is okay to excavate, handle, and return artifacts from away a shipwreck to its same location	30.90%	14.80%	12.30%	12.30%	13.60%	7.40%	8.60%	81
It is okay to excavate, handle, and return artifacts from inside shipwreck to a new location	45.70%	21.00%	8.60%	8.60%	2.50%	3.70%	9.90%	81
It is okay to excavate, handle, and return artifacts from adjacent shipwreck to new location	45.70%	19.80%	8.60%	9.90%	3.70%	3.70%	8.60%	81
It is okay to excavate, handle, and return artifacts from away from shipwreck to new location	43.80%	20.00%	10.00%	8.80%	2.50%	5.00%	10.00%	80

Table 4.8. Continued

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA	n
It is okay to collect and remove artifacts from inside shipwreck	51.90%	9.90%	6.20%	9.90%	4.90%	8.60%	8.60%	81
It is okay to collect and remove artifacts adjacent to a shipwreck	50.00%	11.30%	6.30%	10.00%	5.00%	8.80%	8.80%	80
It is okay to collect and remove artifacts away from a shipwreck	46.90%	13.60%	6.20%	9.90%	4.90%	8.60%	9.90%	81

Note: EU= Extremely unacceptable, VU= Very unacceptable, SU= Somewhat unacceptable, SA= Somewhat acceptable, VA= Very acceptable, and EA= Extremely acceptable

Table 4.9. Acceptability of Number of Artifacts Collected

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA	n
Zero artifacts	2.40%	2.40%	2.40%	9.60%	3.60%	9.60%	69.90%	83
5 artifacts	51.20%	7.30%	9.80%	11.00%	3.70%	8.50%	8.50%	82
10 artifacts	58.00%	9.90%	3.70%	11.10%	2.50%	6.20%	8.60%	81
15 artifacts	61.00%	7.30%	2.40%	14.60%	0.00%	4.90%	9.80%	82
20 artifacts	63.40%	6.10%	3.70%	9.80%	3.70%	3.70%	9.80%	82
25 artifacts	63.40%	6.10%	3.70%	9.80%	1.20%	6.10%	9.80%	82
More than 25 artifacts	63.90%	4.80%	3.60%	9.60%	1.20%	3.60%	13.30%	83

Note: EU= Extremely unacceptable, VU= Very unacceptable, SU= Somewhat unacceptable, SA= Somewhat acceptable, VA= Very acceptable, and EA= Extremely acceptable

Table 4.10. Penetration of Wrecks (n=84)

Answer Options	EU	VU	SU	Not Sure	SA	VA	EA
It is okay to penetrate a shipwreck	0.00%	1.20%	2.40%	9.50%	23.80%	31.00%	2.10%
It is okay to penetrate a wreck on open-circuit scuba (exhaled air accumulates inside wreck)	2.40%	1.20%	7.10%	11.90%	28.60%	23.80%	5.00%
It is okay to penetrate a wreck on closed-circuit rebreather (little to no air accumulates inside wreck)	2.40%	0.00%	3.60%	7.10%	14.30%	39.30%	3.30%

Note: EU= Extremely unacceptable, VU= Very unacceptable, SU= Somewhat unacceptable, SA= Somewhat acceptable, VA= Very acceptable, and EA= Extremely acceptable

4.3 Test Results

The assumptions of independence and normality were met for the dataset. Below each of the analyses are described in detail.

4.3.1 Normative Theory Results

The chart in Figure 4.1 displays the norm curve to determine the potential for conflict among scuba divers and how acceptable they deem collecting a certain number of artifacts on each diving trip taken. The size of the bubbles represent the degree of consensus by representing the value of the PCI_2. The bubble is smallest when $PCI_2=0$ and the consensus is highest. The size of the bubble continues to grow until $PCI_2=1$ and the potential for conflict is highest. Figure 4.1 shows that more than zero artifacts collected is deemed unacceptable by divers, and the potential for conflict among divers goes up significantly past zero artifacts collected. In conclusion, divers in within the sample generally are amenable of not collecting any artifacts, but the potential for conflict goes up and acceptability goes down once the number of artifacts collected goes up to five and maintains those levels past 25 artifacts collected.

4.3.2 Socio-demographic Results

According precedence set by Meyer et al. (2003) and Uyarra et al (2003) an independent samples t-test was used to compare gender according to each sustainable action by divers. The assumption of equal variance was investigated through a Levene's Test for Equality of Variances. Three of the F values were significant at the $p<.05$ level; therefore, equal variances were not assumed for those variables. For the remaining variables, equal variances were assumed. Only four practices of 41 were statistically significant. The means and standard

deviations for gender of each sustainable action that were found to be statistically significant can be seen in Table 4.11. Results of the full analyses are reported in Appendix F.

Figure 4.1.

PCI_2 Model based on acceptability evaluations

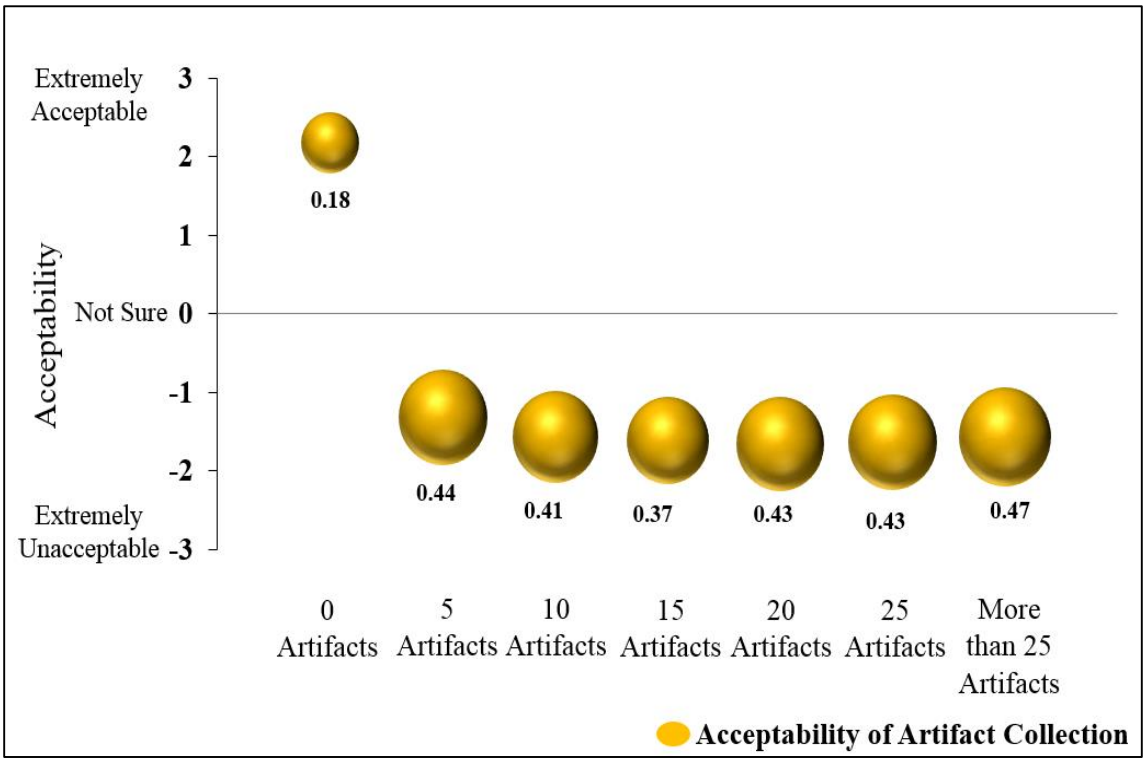


Table 4.11. Means and Standard Deviations of Sustainable Actions by Gender

	Gender			
	Female (n=19)		Male (n=49)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Handle Artifacts Inside Wreck	3.59	2.21	2.53	1.81
Handle Artifacts Adjacent to Wreck	3.76	2.24	2.63	1.89
Remove Artifacts Adjacent to Wreck	2.9	2.23	1.84	1.80
Excavate, handle, and return Artifacts Away From Wreck to same location	3.39	2.05	2.37	1.77

(1= Extremely unacceptable; 2= Very unacceptable; 3= Somewhat unacceptable; 4= Not sure; 5= Somewhat acceptable; 6= Very acceptable; 7= Extremely acceptable)

Handling artifacts inside of the shipwreck, handling artifacts adjacent to the shipwreck, and *removing artifacts adjacent to the shipwreck* were significant at the p<.05 level with equal variances not assumed (Table 4.11). *Excavate, handle, and return artifacts adjacent to wreck to same location* was significant with equal variances assumed at the p<.05 level (Table 4.12). In each of these cases of significance except *excavate, handle, and return artifacts adjacent to wreck,* females felt that these practices were more acceptable than do males. Results of the full analyses are shown in Appendix G.

Table 4.12. T-test Statistics for Gender

Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Handle Artifacts Inside Wreck	Equal variances assumed	**5.99**	**0.02**	1.87	66.00	0.07
	Equal variances not assumed			**2.05**	**39.86**	**0.05**
Handle Artifacts Adjacent to Wreck	Equal variances assumed	**4.58**	**0.04**	1.93	66.00	0.06
	Equal variances not assumed			**2.08**	**38.63**	**0.04**
Remove Artifacts Adjacent to Wreck	Equal variances assumed	**4.14**	**0.05**	1.84	66.00	0.07
	Equal variances not assumed			**2.02**	**40.34**	**0.05**
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Equal variances assumed	**3.08**	**0.08**	**2.00**	**66.00**	**0.05**
	Equal variances not assumed			2.18	39.59	0.04

Within handling artifacts inside of the shipwreck activity, the mean score for females (M=2.53, SD=1.86) was significantly lower than the mean score for males (M=3.59, SD=2.21). Within the handling artifacts adjacent to the shipwreck activity, the mean score for females

(M=2.63, SD=1.89) was also significantly lower than the mean score for males (M=3.76, SD=2.24). Within removing artifacts adjacent to the shipwreck activity, the mean score for females (M=1.84, SD=1.80) was significantly lower than the mean score for males (M=2.90, SD=2.23). Lastly, the *Excavate, handle, and return Artifacts Away From Wreck to same location* activity, the mean score for females (M=3.39, SD=2.05) was significantly higher than males (M=2.37, SD=1.77).

There were 20 respondents with an income of $1,000 to $49,000, 18 respondents with an income of $50,000-$99,000, 13 respondents with an income of $100,000-$149,000, six respondents with an income of $150,000-$199,000, and five respondents with an income of $200,000-$249,000. The one-way Analysis of Variance (ANOVA) revealed that none of the variables were found to be statistically significantly different.

ANOVA was used to investigate differences among respondents with different employment statuses. The researcher determined that ANOVA was an appropriate type of analysis for this study and research purpose. There was no previous literature found that specifically looked at employment status as a factor for divers, however, the researched felt it suitable for this exploratory type study since the data existed, and there may have been significant differences to be found. With that said, the small sample size also greatly limits the power of these results, which limits any interpretation of results. The Levene's Test for the *anchor to structure* activity did not meet the assumption of homogeneity as the F statistic was significant at the $p<.05$ level. For the remaining variables, an ANOVA test was run; however, none of them were statistically significant. Below, the means and standard deviations of the only significantly different variable is reported (Table 4.13). Results of the full analyses are shown in Appendix H.

Table 4.13. Means and Standard Deviations of Employment Status

	Employment Status									
	Self-employed (n=9)		Employed in the private sector (n=19)		Employed in the public sector (n=14)		Employed in the non-profit sector (n=3)		Retired (n=7)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Anchor to Structure	4.00	2.29	4.00	2.54	4.21	1.63	1.33	0.58	3.86	2.19

(1= Extremely unacceptable; 2= Very unacceptable; 3= Somewhat unacceptable; 4= Not sure; 5= Somewhat acceptable; 6= Very acceptable; 7= Extremely acceptable)

The assumptions of independence and normality were met. Welch and Brown-Forsythe's tests were performed to find the adjusted F statistic for the activities that did not meet the assumption of homogeneity (Table 4.14). The Welch and Brown-Forsythe tests demonstrated that the adjusted F statistics for the *anchor to structure* activity was significant at the $p<.05$ level. Results of the full analyses are shown in Appendix I.

Table 4.14. Welch and Brown-Forsythe's Test of Equality of Means for Employment Status

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Anchor to Structure	Welch	6.78	5.00	18.57	0.00
	Brown-Forsythe	2.47	5.00	40.60	0.05

Post-hoc comparisons used the Games-Howell test to investigate the *anchor to structure* activity. The Games-Howell test indicated that for this activity, the mean score for those employed in the non-profit sector (M=1.33, SD=.58) were significantly different from those employed in the public sector (M=4.21, SD=1.63) at the $p<.001$ level and those employed in the private sector (M=4.00, SD=2.54) at the $p<.05$ level. Respondents that were employed in the

non-profit sector were statistically significantly less accepting of anchoring to the shipwreck structure itself. This action has been deemed hazardous to the integrity of the wreck itself, however, it is sometimes the only option to ensure finding the wreck, which could be an integral part of the livelihoods of the respondents working in dive charter businesses.

ANOVA was used to investigate differences among respondents of different ages. The Levene's Test for the *accidentally damage structure* and *deliberately remove feature* activities did not meet the assumption of homogeneity as the F statistic was significant at the $p<.05$ level. For the variables that passed Levene's Test, ANOVA was used, but there were no statistically significant variables found. Below, the means and standard deviations of the only significantly different variable is reported (Table 4.15). Results of the full analyses are displayed in Appendix J.

Table 4.15. Means and Standard Deviations of Age Range

	Age									
	18-30 Years Old (n=22)		**31-40 Years Old (n=12)**		**41-50 Years Old (n=10)**		**51-60 Years Old (n=21)**		**61-70 Years Old (n=4)**	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Accidentally Damage Structure	2.27	1.20	1.67	0.78	1.60	0.70	3.38	1.88	2.75	2.87
Deliberately Remove Feature	1.32	1.04	2.58	2.23	1.50	1.27	3.38	2.48	3.00	2.45

(1= Extremely unacceptable; 2= Very unacceptable; 3= Somewhat unacceptable; 4= Not sure; 5= Somewhat acceptable; 6= Very acceptable; 7= Extremely acceptable)

The assumptions of independence and normality were met. The Levene's Test for the *accidentally damage structure* and *deliberately remove feature* activities did not meet the assumption of homogeneity as the F statistic was significant at the $p<.05$ level. Results of the full analyses are presented in Appendix K.

Welch and Brown-Forsythe's tests were performed to find the adjusted F statistic for the activities that did not meet the assumption of homogeneity (Table 4.16). The Welch and Brown-Forsythe tests demonstrated that the adjusted F statistics for both *accidentally damage structure* and *deliberately remove feature* activities were significant at the p<.05 level. Results of the full analyses are set out in Appendix L.

Table 4.16. Welch and Brown-Forsythe's Test of Equality of Means for Age Range

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Accidentally Damage Structure	Welch	4.03	4.00	16.40	0.02
	Brown-Forsythe	2.79	4.00	7.18	0.11
Deliberately Remove Feature	Welch	3.51	4.00	15.43	0.03
	Brown-Forsythe	3.41	4.00	19.59	0.03

Post-hoc comparisons used the Games-Howell test to investigate the *accidentally damage structure* and *deliberately remove feature* activities. The Games-Howell test indicated that for the *accidentally damage structure* activity, the mean score for respondents between 51-60 years old (M=3.38, SD=1.88) were significantly different from those 31-40 years old (M=1.67, SD=.78) at the p<.01 level and those 41-50 years old (M=1.60, SD=.70) at the p<.01 level. Respondents aged 51-60 were more accepting of accidently damaging the shipwreck structure than their younger counterparts of respondents between the ages of 31-40 and 41-50. Again, using the Games-Howell test for the *deliberately remove feature* activity, the mean score for respondents between 51-60 years old (M=3.38, SD=2.48) were significantly different from those 18-30 years old (M=1.32, SD=1.04) at the p<.01 level and those 41-50 years old (M=1.60, SD=.70) at the p=.01 level. Respondents aged 51-60 were more accepting of deliberately removing a shipwreck feature than younger respondents between the ages of 18-30.

Both of these actions are considered detrimental for the shipwreck sites. For these two activities, the younger divers are less tolerant than the older divers, which could be showing a sign of a paradigm shift between divers of different ages. This data shows that the younger divers are less accepting of even accidentally harming the structure and deliberately removing shipwreck features no matter the reason for doing so. Results of the full analyses are presented in Appendix M.

ANOVA was used to investigate differences among respondents with different education levels. For this data, the researcher determined that ANOVA was an appropriate type of analysis for this study and research purpose. The Levene's Test for the *only anchor to mooring buoy* activity did not meet the assumption of homogeneity as the F statistic was significant at the $p<.05$ level. The variables that passed Levene's Test were analyzed using ANOVA, but there were no statistically significant variables found. Below, the means and standard deviations of the only significantly different variable is reported (Table 4.17). Results of the full analyses are presented in Appendix N.

Table 4.17. Means and Standard Deviations of Education Level

	Education Level					
	Some college/ Associate's degree (n=13)		**Bachelor's degree (n=34)**		**Graduate degree (n=21)**	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**
Only Anchor to Mooring Buoy	3.31	2.18	4.47	1.89	5.81	1.86

(1= Extremely unacceptable; 2= Very unacceptable; 3= Somewhat unacceptable; 4= Not sure; 5= Somewhat acceptable; 6= Very acceptable; 7= Extremely acceptable)

The assumptions of independence and normality were met. Welch and Brown-Forsythe's tests were performed to find the adjusted F statistic for the activities that did not meet the

assumption of homogeneity (Table 4.18). The Welch and Brown-Forsythe tests demonstrated that the adjusted F statistics for the *only anchor to mooring buoy* activity was significant at the $p<.05$ level. Results of the full analyses are exhibited in Appendix O.

Table 4.18. ANOVA Results for Education Level

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Only Anchor to Mooring Buoy	Between Groups	52.74	2.00	7.01	0.00
	Within Groups	244.48	65.00		
	Total	297.22	67.00		

Post-hoc comparisons used the Games-Howell test to investigate the *only anchor to mooring buoy* activity. The Games-Howell test showed that for this activity, the mean score for those with graduate degrees (M=5.81, SD=1.86) were significantly different from those with some college or an Associate's degree (M=3.31, SD=2.18) at the $p<.01$ level and those with a Bachelor's degree (M=4.47, SD=1.89) at the $p<.05$ level. Respondents with graduate degrees were statistically significant more accepting of only diving on shipwrecks that have a mooring buoy. Divers with Bachelor and Associate's degrees were less accepting of being limited to only diving on wrecks with established mooring buoys. Results of the full analyses are shown in Appendix P.

4.3.3 Dive Shop Regulars

Regarding the respondents' view of themselves as dive shop regulars, there were 20 respondents who did not consider themselves a regular at a dive shop and 52 respondents that claimed did. The independent samples t-test on this variable did not yield any statistically significant results. Results of the full analyses are shown in Appendices Q and R.

4.3.4 Archaeological Group T-Test Results

An independent samples t-test was used to compare respondents that were a part of an archaeological group against respondents that were not in an archaeological group against one another in terms of each sustainable action by divers. The assumption of equal variance was investigated through a Levene's Test for Equality of Variances, which all variables failed, therefore equal variances were not assumed. The means and standard deviations for each sustainable action that was found to be significantly significant can be seen in Table 4.19. Results of the full analyses are displayed in Appendix S.

Table 4.19. Means and Standard Deviations of Sustainable Actions by Archaeological Group Membership

	Do you work with a maritime history or archaeological group?			
	No (n=49)		Yes (n=23)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Anchor to Structure	4.00	2.11	2.74	1.76
Only Live-Boating, No Anchor	3.51	1.96	5.43	1.41
Accidentally Damage Structure	2.80	1.71	1.91	1.08
Accidentally Expose Structure	3.18	1.84	2.35	1.19
Deliberately Remove Structure	2.86	2.33	1.48	1.08
Accidentally Damage Feature	2.84	1.75	2.13	1.06
Accidentally Expose Feature	3.10	1.77	2.39	1.08
Deliberately Damage Feature	1.86	1.59	1.13	0.63
Deliberately Expose Feature	2.82	2.20	1.83	1.44
Deliberately Remove Feature	2.78	2.26	1.39	0.94
Accidentally Disturb Artifacts Inside Wreck	3.39	1.96	2.04	1.02
Accidentally Disturb Artifact Adjacent to Wreck	3.59	1.94	2.17	1.07
Accidentally Disturb Artifacts Away From Wreck	3.82	2.07	2.30	1.18
Handle Artifacts Inside Wreck	3.73	2.10	2.26	1.79
Handle Artifacts Adjacent to Wreck	3.92	2.14	2.30	1.79
Handle Artifacts Outside of Wreck	3.94	2.08	2.22	1.68
Move Artifacts Inside of Wreck	2.90	2.01	1.35	0.88
Move Artifacts Adjacent to Wreck	3.04	2.06	1.57	1.47
Move Artifacts Away From Wreck	3.08	2.10	1.39	1.03
Remove Artifacts from Inside of Wreck	3.12	2.39	1.43	1.08
Remove Artifacts Adjacent to Wreck	3.20	2.28	1.35	0.83
Remove Artifacts Away From Wreck	3.39	2.38	1.35	0.83
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.69	1.91	2.57	1.24
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.82	1.90	2.74	1.29
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.88	1.87	2.83	1.34
Excavate, handle, and return Artifacts from Inside of Wreck to same location	3.29	2.05	2.26	1.39
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	3.45	2.05	2.22	1.38
Excavate, handle, and return Artifacts Away From Wreck to same location	3.51	2.07	2.22	1.41
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	3.04	2.14	1.39	0.78
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	3.02	2.09	1.43	0.84

Table 4.19. Continued

	No (n=49)		Yes (n=23)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Excavate, handle, and return Artifacts Away From Wreck to New Location	3.16	2.14	1.43	0.84
Collect Buried Artifacts Inside of Wreck	3.20	2.27	1.57	1.27
Collect Buried Artifacts Adjacent to Wreck	3.29	2.29	1.43	0.90
Collect Buried Artifacts Away From Wreck	3.45	2.29	1.43	0.90

(1= Extremely unacceptable; 2= Very unacceptable; 3= Somewhat unacceptable; 4= Not sure; 5= Somewhat acceptable; 6= Very acceptable; 7= Extremely acceptable)

The assumptions of independence and normality were met. All 34 of the F values were significant at the $p<.05$ level, so equal variances were not assumed for any of these variables (Table 4.20). Results of the full analyses are shown in Appendix T.

Table 4.20. T-test Statistics for Archaeological Group Membership

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Anchor to Structure	Equal variances assumed	**3.60**	**0.06**	**2.48**	**70.00**	**0.02**
	Equal variances not assumed			2.65	50.98	0.01
Only Live-Boating, No Anchor	Equal variances assumed	**6.45**	**0.01**	-4.22	70.00	0.00
	Equal variances not assumed			**-4.74**	**58.13**	**0.00**
Accidentally Damage Structure	Equal variances assumed	**5.74**	**0.02**	2.27	70.00	0.03
	Equal variances not assumed			**2.66**	**63.59**	**0.01**
Accidentally Expose Structure	Equal variances assumed	**5.97**	**0.02**	1.98	70.00	0.05
	Equal variances not assumed			**2.31**	**62.89**	**0.02**
Deliberately Remove Structure	Equal variances assumed	**30.42**	**0.00**	2.70	70.00	0.01
	Equal variances not assumed			**3.43**	**70.00**	**0.00**
Accidentally Damage Feature	Equal variances assumed	**7.15**	**0.01**	1.79	70.00	0.08
	Equal variances not assumed			**2.12**	**65.35**	**0.04**
Accidentally Expose Feature	Equal variances assumed	**5.93**	**0.02**	1.77	70.00	0.08
	Equal variances not assumed			**2.10**	**65.19**	**0.04**
Deliberately Damage Feature	Equal variances assumed	**16.18**	**0.00**	2.10	70.00	0.04
	Equal variances not assumed			**2.77**	**68.56**	**0.01**
Deliberately Expose Feature	Equal variances assumed	**8.51**	**0.00**	1.97	70.00	0.05
	Equal variances not assumed			**2.28**	**62.38**	**0.03**
Deliberately Remove Feature	Equal variances assumed	**31.16**	**0.00**	2.82	70.00	0.01
	Equal variances not assumed			**3.67**	**69.37**	**0.00**

Table 4.20. Continued

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Accidentally Disturb Artifacts Inside Wreck	Equal variances assumed	**17.23**	**0.00**	3.10	70.00	0.00
	Equal variances not assumed			**3.83**	**69.09**	**0.00**
Accidentally Disturb Artifact Adjacent to Wreck	Equal variances assumed	**17.69**	**0.00**	3.28	70.00	0.00
	Equal variances not assumed			**3.99**	**67.93**	**0.00**
Accidentally Disturb Artifacts Away From Wreck	Equal variances assumed	**15.68**	**0.00**	3.26	70.00	0.00
	Equal variances not assumed			**3.93**	**67.07**	**0.00**
Handle Artifacts Inside Wreck	Equal variances assumed	**3.01**	**0.09**	**2.91**	**70.00**	**0.00**
	Equal variances not assumed			3.08	50.04	0.00
Handle Artifacts Adjacent to Wreck	Equal variances assumed	**3.03**	**0.09**	**3.13**	**70.00**	**0.00**
	Equal variances not assumed			3.34	50.78	0.00
Handle Artifacts Outside of Wreck	Equal variances assumed	**4.81**	**0.03**	3.48	70.00	0.00
	Equal variances not assumed			**3.75**	**52.54**	**0.00**
Move Artifacts Inside of Wreck	Equal variances assumed	**17.99**	**0.00**	3.53	70.00	0.00
	Equal variances not assumed			**4.54**	**69.83**	**0.00**
Move Artifacts Adjacent to Wreck	Equal variances assumed	**6.72**	**0.01**	3.08	70.00	0.00
	Equal variances not assumed			**3.47**	**58.45**	**0.00**
Move Artifacts Away From Wreck	Equal variances assumed	**16.92**	**0.00**	3.65	70.00	0.00
	Equal variances not assumed			**4.58**	**69.78**	**0.00**
Remove Artifacts from Inside of Wreck	Equal variances assumed	**36.19**	**0.00**	3.23	70.00	0.00
	Equal variances not assumed			**4.13**	**69.96**	**0.00**

Table 4.20. Continued

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Remove Artifacts Adjacent to Wreck	Equal variances assumed	**35.60**	**0.00**	3.77	70.00	0.00
	Equal variances not assumed			**5.03**	**67.26**	**0.00**
Remove Artifacts Away From Wreck	Equal variances assumed	**49.35**	**0.00**	3.99	70.00	0.00
	Equal variances not assumed			**5.35**	**66.43**	**0.00**
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Equal variances assumed	**11.84**	**0.00**	2.59	70.00	0.01
	Equal variances not assumed			**3.01**	**62.69**	**0.00**
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Equal variances assumed	**9.68**	**0.00**	2.46	70.00	0.02
	Equal variances not assumed			**2.82**	**60.86**	**0.01**
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Equal variances assumed	**6.86**	**0.01**	2.42	70.00	0.02
	Equal variances not assumed			**2.73**	**58.32**	**0.01**
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Equal variances assumed	**6.79**	**0.01**	2.17	70.00	0.03
	Equal variances not assumed			**2.49**	**60.87**	**0.02**
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Equal variances assumed	**8.70**	**0.00**	2.61	70.00	0.01
	Equal variances not assumed			**3.00**	**61.16**	**0.00**

Table 4.20. Continued

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Excavate, handle, and return Artifacts Away From Wreck to same location	Equal variances assumed	**6.93**	**0.01**	2.71	70.00	0.01
	Equal variances not assumed			**3.10**	**60.57**	**0.00**
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Equal variances assumed	**21.49**	**0.00**	3.57	70.00	0.00
	Equal variances not assumed			**4.76**	**67.32**	**0.00**
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Equal variances assumed	**19.84**	**0.00**	3.50	70.00	0.00
	Equal variances not assumed			**4.58**	**68.99**	**0.00**
Excavate, handle, and return Artifacts Away From Wreck to New Location	Equal variances assumed	**22.03**	**0.00**	3.72	70.00	0.00
	Equal variances not assumed			**4.89**	**68.60**	**0.00**
Collect Buried Artifacts Inside of Wreck	Equal variances assumed	**22.48**	**0.00**	3.22	70.00	0.00
	Equal variances not assumed			**3.91**	**67.66**	**0.00**
Collect Buried Artifacts Adjacent to Wreck	Equal variances assumed	**43.13**	**0.00**	3.73	70.00	0.00
	Equal variances not assumed			**4.91**	**68.50**	**0.00**
Collect Buried Artifacts Away From Wreck	Equal variances assumed	**42.63**	**0.00**	4.06	70.00	0.00
	Equal variances not assumed			**5.34**	**68.50**	**0.00**

There were 33 variables that represented activities defined as unsustainable by the literature that respondents that were not involved in archaeological groups cited as more acceptable. The one activity deemed less acceptable by respondents in archaeological groups (M=5.43, SD=1.41) than respondents not in archaeological groups (M=3.51, SD=1.96), *only live-boating, no anchor*, was deemed as a sustainable activity by the literature thus falling in line with the other 33 activities where statistically significant differences were found. This would lead to the conclusion that divers that belong to archaeological groups are more in line with the literature in terms of defining sustainable activities in shipwreck diving.

4.3.5 ANOVA Shipwreck Diving Experience Results

ANOVA was used to investigate differences among respondents that have been shipwreck diving for different amounts of time. The *okay to penetrate wreck* activity did not meet the assumption of homogeneity as it failed the Levene's Test, and the F statistic was significant at the $p<.05$ level. ANOVA was used to test the 15 variables that met the assumption of homogeneity. Below, the means and standard deviations of the significantly different variables are reported (Table 4.21). Results of the full analyses are displayed in Appendix U.

Table 4.21. Means and Standard Deviations of Number of Years Diving on Shipwrecks

	How many total years have you been scuba diving on shipwrecks?									
	0-10 Years (n=48)		11-20 Years (n=21)		21-30 Years (n=10)		31-40 Years (n=6)		More Than 40 Years (n=2)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Deliberately Expose Structure	2.09	1.67	2.57	2.13	2.89	2.32	5.17	2.40	5.50	0.71
Handle Artifacts Inside Wreck	2.94	2.00	3.76	2.23	3.60	2.07	5.83	2.04	5.00	0.00
Handle Artifacts Adjacent to Wreck	3.09	2.06	3.76	2.32	3.90	2.02	5.83	2.04	5.00	0.00
Move Artifacts Inside of Wreck	2.09	1.73	2.38	1.77	3.00	2.05	4.67	2.73	3.50	2.12
Move Artifacts Adjacent to Wreck	2.19	1.85	2.57	2.04	3.10	1.97	4.67	2.73	4.50	0.71
Move Artifacts Away From Wreck	2.15	1.74	2.52	1.94	3.50	2.27	4.67	2.73	3.00	2.83
Remove Artifacts from Inside of Wreck	2.02	1.89	2.81	2.18	3.40	2.32	5.33	2.42	3.50	2.12
Remove Artifacts Adjacent to Wreck	2.09	1.89	2.80	2.24	3.30	1.83	5.33	2.42	2.00	0.00
Remove Artifacts Away From Wreck	2.21	2.01	2.81	2.18	3.60	2.17	5.33	2.42	3.50	2.12
Excavate, handle, and return Artifacts from Inside of Wreck to same location	2.70	1.79	3.35	2.23	3.30	1.89	5.17	2.40	5.00	0.00
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	2.07	1.67	2.65	2.09	2.90	1.73	4.67	2.73	3.50	2.12
Excavate, handle, and return Artifacts Away From Wreck to New Location	2.11	1.72	2.71	2.05	3.30	2.11	4.67	2.73	3.50	2.12
Collect Buried Artifacts Inside of Wreck	2.07	1.77	2.82	2.19	3.40	2.32	5.33	2.42	3.50	2.12
Collect Buried Artifacts Adjacent to Wreck	2.09	1.76	2.94	2.21	3.40	2.32	5.33	2.42	3.50	2.12
Collect Buried Artifacts Away From Wreck	2.15	1.85	2.88	2.15	3.80	2.20	5.33	2.42	3.50	2.12
Okay to Penetrate Wreck	5.66	1.09	5.47	1.35	6.00	1.00	6.83	0.41	6.50	0.71

(1= Extremely unacceptable; 2= Very unacceptable; 3= Somewhat unacceptable; 4= Not sure; 5= Somewhat acceptable; 6= Very acceptable; 7= Extremely acceptable)

The assumptions of independence and normality were met. Welch and Brown-Forsythe's tests were performed to find the adjusted F statistic for the activities that did not meet the assumption of homogeneity (Table 4.22). The Welch and Brown-Forsythe tests demonstrated

that the adjusted F statistics for the *okay to penetrate wreck* activity was significant at the p<.05 level. Results of the full analyses are laid out in Appendix V.

Table 4.22. Welch and Brown-Forsythe's Test of Equality of Means for Number of Years Diving

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Okay to Penetrate Wreck	Welch	6.16	4.00	6.91	0.02
	Brown-Forsythe	3.06	4.00	26.04	0.03

ANOVA was used to investigate the dimensions that met the assumption of homogeneity (Table 4.23). The results showed that there were statistically significant variances among groups for 15 sustainable activities. Results of the full analyses are displayed in Appendix W.

Table 4.23. ANOVA Results for Number of Years Diving

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Deliberately Expose Structure	Between Groups	69.56	4.00	4.78	0.00
	Within Groups	291.02	80.00		
	Total	360.59	84.00		
Handle Artifacts Inside Wreck	Between Groups	53.54	4.00	3.15	0.02
	Within Groups	343.85	81.00		
	Total	397.40	85.00		
Handle Artifacts Adjacent to Wreck	Between Groups	47.73	4.00	2.68	0.04
	Within Groups	361.20	81.00		
	Total	408.93	85.00		
Move Artifacts Inside of Wreck	Between Groups	41.01	4.00	2.96	0.02
	Within Groups	280.45	81.00		
	Total	321.45	85.00		
Move Artifacts Adjacent to Wreck	Between Groups	43.18	4.00	2.79	0.03
	Within Groups	313.15	81.00		
	Total	356.34	85.00		
Move Artifacts Away From Wreck	Between Groups	43.73	4.00	2.88	0.03
	Within Groups	307.03	81.00		
	Total	350.76	85.00		
Remove Artifacts from Inside of Wreck	Between Groups	69.38	4.00	4.10	0.00
	Within Groups	342.45	81.00		
	Total	411.83	85.00		
Remove Artifacts Adjacent to Wreck	Between Groups	63.27	4.00	3.93	0.01
	Within Groups	318.29	79.00		
	Total	381.56	83.00		
Remove Artifacts Away From Wreck	Between Groups	62.01	4.00	3.51	0.01
	Within Groups	357.34	81.00		
	Total	419.35	85.00		
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Between Groups	41.67	4.00	2.78	0.03
	Within Groups	284.55	76.00		
	Total	326.22	80.00		

Table 4.23. Continued

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Between Groups	40.80	4.00	2.94	0.03
	Within Groups	263.42	76.00		
	Total	304.22	80.00		
Excavate, handle, and return Artifacts Away From Wreck to New Location	Between Groups	43.08	4.00	2.89	0.03
	Within Groups	279.91	75.00		
	Total	322.99	79.00		
Collect Buried Artifacts Inside of Wreck	Between Groups	66.49	4.00	4.22	0.00
	Within Groups	299.51	76.00		
	Total	366.00	80.00		
Collect Buried Artifacts Adjacent to Wreck	Between Groups	65.98	4.00	4.20	0.00
	Within Groups	294.82	75.00		
	Total	360.80	79.00		
Collect Buried Artifacts Away From Wreck	Between Groups	68.87	4.00	4.29	0.00
	Within Groups	305.13	76.00		
	Total	374.00	80.00		
	Total	136.92	82.00		

Post-hoc comparisons used the Games-Howell test to investigate the *okay to penetrate wreck* activity. The Games-Howell test indicated that for this activity, the mean score for those that have been diving on shipwrecks for 31-40 years (M=6.83, SD=.41) were significantly different from those that have been diving for 0-10 years (M=5.66, SD=1.09) at the $p<.01$ level and those that have been diving for 11-20 years (M=5.47, SD=1.35) at the $p<.01$ level.

The Tukey HSD was used for the 15 variables that the ANOVA determined to be statistically significant at the .05 level. In each sustainable activity, the divers with 31-40 years of experience were found to be statistically significantly more accepting of engaging in activities that are considered detrimental to shipwrecks by the literature. The one exception to this was the

deliberately expose structure activity, which it was determined that divers with 31-40 years of experience (M=5.17, SD=2.40) were significantly different than those with 0-10 years of experience (M=2.09, SD=1.67) at the $p<.01$ level and divers with 11-20 years of experience (M=2.57, SD=2.13) at the $p<.05$ level because it also included a statistically significant variance with diver with 11-20 years of experience as well.

Each of the variables have higher level of acceptance from divers that have 31-40 years of experience than divers with 0-10 years of experience. Since all of the actions are considered unhealthy to shipwrecks by the literature, this means that the respondents that are new to shipwreck diving define acceptable behaviors more in line with the literature than the divers with more experience. This could be a sign of a paradigm shift within the shipwreck diving community.

4.3 Summary of Test Results

The following chart (Table 4.25) gives a summary of all sustainable activities that were found statistically significant for each variable. The income and being a regular at a dive shop variables are not included on the chart since they did not return any statistically significant differences between participant groups for any of the sustainable actions. Results of the full analyses of income are presented in Appendices X, Y, and Z. Being a member of an archaeological group and the number of years of experience shipwreck diving are the two variables that returned the most statistically significant results.

Table 4.25. Summary of Significant Differences in Sustainable Actions across Respondent Variables

Sustainable Actions	Gender	Employment Status	Age	Education	Archaeological Group	Years Diving
Anchor to Structure		X			X	
Anchor in Sediment						
Only Anchor to Mooring Buoy				X		
Only Live-Boating, No Anchor					X	
Accidentally Damage Structure			X		X	
Accidentally Expose Structure					X	
Deliberately Damage Structure						
Deliberately Expose Structure						X
Deliberately Remove Structure					X	
Accidentally Damage Feature					X	
Accidentally Expose Feature					X	
Deliberately Damage Feature			X		X	
Deliberately Expose Feature					X	
Deliberately Remove Feature					X	
Accidentally Disturb Artifacts Inside Wreck					X	
Accidentally Disturb Artifact Adjacent to Wreck					X	
Accidentally Disturb Artifacts Away From Wreck					X	
Handle Artifacts Inside Wreck	X				X	X
Handle Artifacts Adjacent to Wreck	X				X	X
Handle Artifacts Outside of Wreck					X	
Move Artifacts Inside of Wreck					X	X
Move Artifacts Adjacent to Wreck					X	X

Table 4.25. Continued

Sustainable Actions	Gender	Employment Status	Age	Education	Archaeological Group	Years Diving
Move Artifacts Away From Wreck					X	X
Remove Artifacts from Inside of Wreck					X	X
Remove Artifacts Adjacent to Wreck	X				X	X
Remove Artifacts Away From Wreck					X	X
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck					X	
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck					X	
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck					X	
Excavate, handle, and return Artifacts from Inside of Wreck to same location					X	X
Excavate, handle, and return Artifacts Adjacent to Wreck to same location					X	
Excavate, handle, and return Artifacts Away From Wreck to same location	X				X	
Excavate, handle, and return Artifacts from Inside of Wreck to New Location					X	
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location					X	X
Excavate, handle, and return Artifacts Away From Wreck to New Location					X	X
Collect Buried Artifacts Inside of Wreck					X	X
Collect Buried Artifacts Adjacent to Wreck					X	X
Collect Buried Artifacts Away From Wreck					X	X
Okay to Penetrate Wreck						X

Table 4.25. Continued

Sustainable Actions	Gender	Employment Status	Age	Education	Archaeological Group	Years Diving
Okay to Penetrate Wreck on Open-Circuit Scuba						
Okay to Penetrate Wreck on Closed-Circuit rebreather						

Note: The variables of income and regular at a dive shop did not yield statistically significant results

Chapter 5: Discussion

5.1 Introduction

This study examined the ways in which the sample of divers identify sustainable shipwreck diving activities to gain a better understanding of how their behavior impacts the future of sustainable cultural tourism on the coast of North Carolina. The information revealed the attitudes of respondents regarding how human activities affect the sustainability of submerged maritime archaeological sites.

5.2 Variables Tested

Within this study, different variables were analyzed across each attitude measured. Each sustainable action attitude was assessed using a 7-point Likert type scale. The independent variables included gender, age, education level, employment status, income, number of years of experience diving on shipwrecks, archaeological group membership, and if the participant considered themselves a regular at a dive shop. All variables tested found statistically significant differences between groups pertaining to different sustainable actions attitudes except the regular at a dive shop and income variables.

The vast majority of respondents considered themselves a regular at a dive shop (n=52 of 72 responses), which might underlie why no statistically significant differences were found. The income variable was more even distributed, but did not yield any statistically significant differences, indicating that respondents across income levels had parity in how they define sustainable shipwreck diving activities.

5.2.1 Sociodemographic Variables

The results of the current study agree with what Todd et al. (2001) found in that the older, more experienced divers tended to support artifact collection and other actions that are now considered to be detrimental to the shipwrecks themselves by the literature (Stone 1996; McCarthy 2000; Jewell 2004; Edney 2006). As the authors pointed out, it could be because the older divers grew up in a culture were these actions were acceptable (Todd et al. 2001).

For the age variable, post-hoc comparisons indicated that the respondents aged 51-60 were more accepting of *deliberately removing a shipwreck feature* than younger respondents between the ages of 18-30. Additionally, respondents aged 51-60 were more accepting of *accidently damaging the shipwreck structure* than their younger counterparts of respondents between the ages of 31-40 and 41-50. These actions were cited as being detrimental to the shipwreck by Stone (1996), Jewell (2004), and Edney (2006). This could have implications for those whom wish to train divers on how to leave less of an impact during shipwreck diving in that younger divers will be more responsive to behaving in a manner that is in line with the literature than older divers. It also could mean that older divers will have to change their behavior more than younger divers to be in line with the literature.

Regarding education level, post-hoc comparisons noted that respondents with graduate degrees were more accepting of *only diving on shipwrecks that have a mooring buoy*. Divers with Bachelor and Associate's degrees were less accepting of being limited to only diving on wrecks with established mooring buoys. This could lead them to believe that it is acceptable to only dive on shipwrecks have mooring buoys attached to them.

The analysis of gender differences resulted in four statistically significant diving actions. Within *handling artifacts inside of the shipwreck, handling artifacts adjacent to the shipwreck activity,* and *removing artifacts adjacent to the shipwreck* activities, the mean score for females was significantly lower than the mean score for males. However, the *excavate, handle, and return artifacts away from wreck to same location* activity resulted in the mean score for females being significantly higher than males. Overall, the results are at least somewhat mixed on how male and female divers define sustainable action in shipwreck diving. Previous studies have shown that there tend to be differences between male and female divers.

Meyer et al. (2003) found that males are more extrinsically driven to dive while females are more intrinsically driven. Extrinsic rewards are defined as recognition and an outlet to display one's findings to others, while intrinsic rewards are defined as challenge, personal testing, or decision-making. This would explain the *removing artifacts adjacent to the shipwreck* activity, but would not explain why the other artifact collection activities did not test as statistically different between genders. Uyarra et al. (2009) found that males noticed the shape of the coral and the presence of large fish in reef diving, which could be translated to handling artifacts in shipwreck diving as males were found to enjoy more risky activities. All in all, this study did not produce enough congruent information to make a determination about differences in gender and sustainable shipwreck diving behaviors.

And finally, in regards to the employment variable, respondents working in the non-profit sector were less accepting of anchoring to the shipwreck structure itself (the *anchor to structure* activity). This action has been deemed hazardous to the integrity of the wreck by Edney (2006:214), however, it is sometimes the only option to ensure finding the wreck, which could be a vital part of the livelihoods of the respondents who run, or regularly utilize charter boats in

their diving activities. This could simply be a matter of where necessity forces less than desirable actions. The author speculates that perhaps this result might also be due the inclination of non-profit employees to advocate for a particular cause, which might raise their awareness to the potential harm caused by certain practices.

5.2.2 Diver Experience

For the number of years of experience diving on shipwrecks variable, many more actions were found to be statistically different. In each of the following activities listed in Table 5.1, post-hoc comparisons found differences between divers with 31-40 years of experience and divers with 0-10 years of experience: For the *okay to penetrate wreck* and *deliberately expose structure* activities, participants with 31-40 years of experience were statistically significantly different with those with 11-20 years of diving experience as well.

Table 5.1. Statistically Significant Activities by Diver Experience

Handle Artifacts Inside Wreck	Handle Artifacts Adjacent to Wreck	Move Artifacts Inside of Wreck	Move Artifacts Adjacent to Wreck	Move Artifacts Away From Wreck
Remove Artifacts Adjacent to Wreck	Remove Artifacts Away From Wreck	Excavate, handle, and return Artifacts from Inside of Wreck to same location	Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Excavate, handle, and return Artifacts Away From Wreck to New Location
Collect Buried Artifacts Adjacent to Wreck	Collect Buried Artifacts Away From Wreck	It is okay to penetrate a shipwreck.		

It is a possibility that divers with less experience diving on shipwrecks have views that are more in line with defining sustainable diving behaviors as the aforementioned literature of Stone (1996), McCarthy (2000), Jewell (2004), and Edney (2006) because the diving training

materials have taken a leaf out their books. Major diver training entities such as NAUI, PADI, and SDI have incorporated information that emphasizes the negative impacts of actions such as artifact collection and promoted minimal impact water skills that leave shipwreck sites virtually untouched by divers (NAUI 2010, 2013a, 2013b; PADI 2010; Pulley 2014, elec. comm.). The way in which the CRM theory has leaked into diver training could be a major player in the paradigm shift that is occurring within the NC shipwreck diving community.

It is notable that while Todd et al. (2001) found that divers of all skill levels tend to disagree that the bubbles they emit have a negative impact on the shipwrecks, this study found that the more experienced divers are statistically significantly more accepting of *penetrating wrecks*, which was deemed harmful to the shipwreck by Edney (2006:219). This could imply that the more experienced divers do not think their exhaled bubbles harm the wreck as much as the less experienced divers. However, this is not likely since the *okay to penetrate wreck on open-circuit scuba* activity was not found to be statistically significant different between divers of different experience levels, which could mean the less experienced divers simply do not feel comfortable enough to go inside of the shipwreck. Since the age variable did not return as many significantly differences as the number of years of experience shipwreck diving variable, it could lead to the conclusion that age is a less important variable than experience. If a participant got into diving later in life than another, that participant could share the same definition of sustainable diving actions as a younger participant in the same cohort. This leads to the possibility that age was a spurious variable in the Todd et al. (2001) study, and the real variable between the paradigm shift was number of years shipwreck diving.

5.2.3 Archaeological Group Membership

There were 34 activities with statistically significant differences between divers that were involved in archaeological groups and those that were not (Table 5.2). In each activity, the divers that belong to archaeological groups are less accepting of the actions defined as harmful to the shipwreck by the literature (Stone 1996; McCarthy 2000; Jewell 2004; Edney 2006). This leads to the conclusion that divers belonging to archaeological groups are more in line with the literature in terms of defining sustainable activities in shipwreck diving. This could be due to the fact that these individuals have been educated by professionals according to the precepts of CRM theory, or, at the very least, have surrounded themselves with other avocational archaeologists who have received such education.

Table 5.2. Statistically Significant Activities by Archaeological Group

Anchor to Structure	Accidentally Damage Structure	Accidentally Expose Structure	Deliberately Remove Structure	Accidentally Damage Feature	Accidentally Expose Feature
Deliberately Damage Feature	Deliberately Expose Feature	Deliberately Remove Feature	Accidentally Disturb Artifacts Inside Wreck	Accidentally Disturb Artifact Adjacent to Wreck	Accidentally Disturb Artifacts Away From Wreck
Handle Artifacts Inside Wreck	Handle Artifacts Adjacent to Wreck	Handle Artifacts Outside of Wreck	Move Artifacts Inside of Wreck	Move Artifacts Adjacent to Wreck	Move Artifacts Away From Wreck
Remove Artifacts from Inside of Wreck	Remove Artifacts Adjacent to Wreck	Remove Artifacts Away From Wreck	Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Accidentally Disturb Sediments Exposing Artifacts Away From Wreck
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Excavate, handle, and return Artifacts Away From Wreck to same location	Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Excavate, handle, and return Artifacts Away From Wreck to New Location
Collect Buried Artifacts Inside of Wreck	Collect Buried Artifacts Adjacent to Wreck	Collect Buried Artifacts Away From Wreck			

5.2.4 Norm Curve on Artifact Collection

The question of the survey based on normative theory found that more than zero artifacts collected is deemed unacceptable by divers, and the potential for conflict among divers goes up significantly past zero artifacts collected. This means that NC divers generally are acquiescent of not collecting any artifacts, but the potential for conflict goes up and acceptability goes down

once the number of artifacts collected goes up to five and maintains those levels past 25 artifacts collected.

Loomis et al. (2008) found behavior norms to include not breaking off a piece of live coral and not taking dead coral. The current study could be considered in line with the results Loomis et al. (2008) in that the shipwreck divers have a behavior norm of collecting between zero and five artifacts per diving trip. Cialdini et al. (1990) would define the descriptive norm for shipwreck divers as collecting less than five artifacts at a time because this is an action that divers partake in. However this number could be narrowed down in a future study.

5.3 Sustainable Behavior Across Groups of Activities

There was not a noticeable split across different groups of sustainable activities. For instance, it did not seem to matter whether the artifacts were *buried* or *on the surface* in regards to *artifact collection* and *handling*. The real schism between defining sustainable practices was between divers of different experience levels. If respondents felt that it was acceptable to *handle or remove artifacts*, it did not seem to matter much to them where the artifacts were originally placed. The proximity of the artifact with the shipwreck itself was a non-issue to respondents. In essence, participants fell into one of two camps, one that views it as okay to cause damage to shipwrecks and one that does not. The individual items asked in the survey did not get that much attention as only one overall theme arose.

5.4 Implications for Sustainable Tourism

Economic sustainability is one pillar of sustainable tourism. If divers continue to damage shipwrecks or remove the artifacts from them or if the shipwrecks themselves are destroyed by

diver behaviors, there will be a severe economic loss to dive shop owners and charter boat captains alike. This will come from the no longer having a shipwreck to attract people to the area. Shipwrecks are an important part of international and domestic tourism on a global scale that is a major component of local economies (O'Neil et al. 2000; Edney 2012). This raises major implications for local economies depending on tourism dollars looking to attract shipwreck diving tourists. If the shipwrecks are deteriorated to the point that they no longer attract divers, local economies will suffer in result.

McKercher and du Cross (2002) noted that needs of tourists are just one part of several considerations that need to be kept in mind when managing culture heritage sites. The positive impacts of tourism need to be magnified while reducing the negative impacts as much as possible as to manage tourism with conservation. This study reinforces the need for education about shipwreck diving sustainability. This can take many forms such as diving slates, signs, and educational pamphlets. While recreational diving training manuals have included some of the sustainable practices, there are still shortfalls in the areas of the benefits of mooring buoys and the negative effects of divers penetrating shipwrecks.

This study also found that divers new to the sport are more accepting of sustainable behaviors. This would indicate that if dive shops could solicit to less experienced divers, they would adhere more to sustainable behaviors. This could be done through the use of marketing materials to promote shipwreck diving to more inexperienced divers or it could be through the promotion of diving on shipwrecks that require less diving experience to do so. Additionally, targeting 'sustainability education' to the older, more experienced divers would be time well spent as they have proven they are the group that is most misaligned view of sustainable actions in shipwreck diving.

One major implication that this study found is that not all divers completely disagree with the sustainable shipwreck diving literature. This study has shed light on the fact that while there are divers out there that feel that it is acceptable to take several artifacts at one time, the vast majority felt that it was an unacceptable practice. The diving community has felt that managers have lumped them into one group with a completely contrary definition of sustainable diving behaviors than what the literature says. This study has shown that not to be the case, which would mean that managers should be more open to communicating with the diving community as a whole.

5.5 Limitations and Future Research Directions

This was an exploratory study and as such it contained inherent limitations. The data for this study was collected through an online survey, which restricted data collection to individuals that have access to the Internet. Additionally, the survey was lengthy, which may have discouraged divers from participating. If the survey focused on only one dimension of shipwreck diving, perhaps a higher response rate might have been achieved. Also, a portion of the population of NC shipwreck divers may have felt duress as they see impending regulations of shipwreck diving impacting their ability to continue to dive on the wrecks (Robert Bradish 2014, elec. comm.; Hibbs 2014). This may make them hesitant to answer surveys such as the one in this study and nearly impossible to convince them that the study is benign to them and that it is being conducted for research purposes only. Their concern was the biggest hurdle to this project.

To better reach shipwreck divers, an introductory visit prior to the study to dive shop owners and charter boat captains might assist in increasing response rate. This would create buy in of the study by the dive shop owners and charter boat captains and convince them to send the

survey out to their mailing lists. Also, partnering with diver certification agencies such as NAUI or PADI could grant the researcher access to divers databases. This could also be done with scientific diver associations such as AAUS. There is also the option of going on the dive boat and surveying the divers while they are on an excursion. Access to divers proved to be the largest barrier over the course of this study.

Because the current study found that it did not matter to the respondents where the artifacts were located, future research might consider narrowing the question pool to those about handling, removing, and excavating for artifacts regardless of where they are located in proximity to the wreck.

The one variable that came up as being statistically different across a number of groups was the *only anchor to mooring buoy* activity. This meant that if participants marked this as an acceptable behavior, they were content with only diving on wrecks with mooring buoys. Further research could look into the support of providing divers with more mooring buoys complete with qualitative research about ideas on how to maintain them in the face of storms that can rip them apart.

Also, future research that intends to create a norm curve on the number of artifacts collected should ask about collecting one, two, three, four, five, and more than five artifacts. This study found that while zero was acceptable, five was generally unacceptable. This would direct future research to try to find the difference in increments of ones instead of fives as this study sought.

Future research could look at the inclusion of diving slates found in the previous studies of Todd et al. (2001) and Jewell (2004) in NC shipwreck diving. This study would look at their

effectiveness in influencing attitudes towards shipwreck diving and preventing damage to underwater resources. Exploring divers in other states, East Coast vs. West Coast divers, and divers in other nations would provide a broader view into sustainability attitudes and practices. Moreover, exploring a possible relationship with divers' proximity to the coast could be another variable to examine. Looking for differences between divers that live on the coast and ones that live more inland could turn up differences in how they view sustainable actions in shipwreck diving.

Lastly, future research should recognize the difficulty of soliciting shipwreck divers' participation in a survey. The research design should consider ways to reach the divers, including working with dive shop owners and charter boat captains to distribute the surveys to divers in their email lists. This could increase the sample size thus producing stronger results.

5.6 Conclusion

The purpose of this study was to gain insight into diver perspectives regarding a multitude of sustainable shipwreck diving activities by examining diver characteristics and motivations for wreck diving. Because there is little scholarly literature that examines shipwreck diver attitudes and sustainable behaviors, the current study begins to create a body of knowledge pertaining to a sample of NC shipwreck divers and their attitudes. With continued research into divers' practices, as well as their view on sustainable diving practices, it could be possible to extend the lives of shipwrecks by reaching an understanding with divers about how to define truly sustainable shipwreck diving behaviors.

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APPENDIX A: IRB Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/irb**

Notification of Exempt Certification

From: Social/Behavioral IRB
To: Nathan Richards
CC:
Nathan Richards
James Duncan
Date: 6/11/2014
Re: UMCIRB 14-000869
Investigating SCUBA divers' attitudes to sustainable shipwreck diving in NC

I am pleased to inform you that your research submission has been certified as exempt on 6/11/2014 . This study is eligible for Exempt Certification under category #2 .

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: Details of Recreational Scuba Shops, Businesses, and Charters in NC

(From ncwreckdiving.com)

Black Jack Tech Diving	11815A US 15-501	Aberdeen	1-910-426-3483
DOD Scuba	45B West Depot Street	Angier	1-919-255-0552
Bermuda Triangle	2144 Hendersonville, Suite #E	Arden	1-828-252-8707
Skyland Snorkel & Scuba	2134 Hendersonville	Arden	1-828-687-7710
Sandhill Scuba Inc.	1307 N. Fayetteville St	Asheboro	1-336-626-2776 shop/1-910-974-3965 res.
Asheville Scuba & Snorkel	-	Asheville	1-828-252-8707
Atlantic Beach Diving	Atlantic Beach Causeway	Atlantic Beach	1-757-617-2208/1-443-255-3775
Diver Down	c/o Captain Bobby Cox	Atlantic Beach	1-252-240-2043
Divocean Dive Center	212 Atlantic Beach Causeway	Atlantic Beach	1-(252)726-3575
Seahorse Charters	c/o Capt. Greg Brownell	Atlantic Beach	1-252-617-2641
Atlantis Charters	145 Intracoastal Waterway	Beaufort	1-252-728-6244/1-252-723-7577
Discovery Diving Company	414 Orange Street	Beaufort	1-252-728-2265
Tortuga Adventures	238 Old Causeway	Beaufort	1-919-272-5561
Greensboro Scuba	7113 Brown Summit Road	Brown Summit	1-336-656-7856
Burlington Dive Center	429 Trollinger Street	Burlington	1-910-229-0793
Piedmont Divers Supply	132 E. Davis Street	Burlington	1-910-226-5206
Chapel Hill/Carborro Dive Center	103 B West Weaver Street	Carborro	1-919-942-8363
Cape Fear Divers	809 N. Lake Park Blvd.	Carolina Beach	1-910-458-7390
Parrot Head Dive Charters	Ocean Marina	Carolina Beach	
OceanicX	307 Promontory Point Drive	Cary	919-463-0805
Sea Ventures	-	Cary	1-919-467-2822
Carolina Divers	4724-H Old Pineville Road	Charlotte	-
Custom Diving Services	601-18 Farmhurst Drive	Charlotte	-
Paradise Island Divers	2317 South Boulevard	Charlotte	1-704-525-9234
Breeze Scuba	-	China Grove	1-704-855-1501
The Dive Shop	PO Box 877, Exit 135, Interstate 40	Claremont	1-800-848-3467/1-828-459-7440
Born Diving	8305-D Magnolia Estates Drive	Cornelius	1-704-896-8055
Seaduction Dive Services	206 S. Clinton Ave.	Dunn	1-910-892-7878
Water World	135 S. Miami Blvd	Durham	1-919-596-8185
Fraud Giggin Charters	c/o Capt. Andy Wolfe	Emerald Isle	1-336-880-1945
Aqua-Nut Dive Service	3703-1 Bragg Blvd.	Fayetteville	1-910-864-3577
Cape Fear Diving	5447 Yadkin Road	Fayetteville	1-910-867-2844
Carolina Coast Diving	116 Old Street	Fayetteville	1-910-482-3482

Rec-Tec Scuba	3703-1 Bragg Blvd.	Fayetteville	1-910-867-3996
Aquatic Adventures	-	Franklin	1-828-524-7532
Diamond Shoals Dive Center	Hwy 12	Frisco	1-252-995-4021
Air Hogs Scuba	5176-A NC Highway 42 West	Garner	1-919-747-9021
Sharky's Dive Center	806 E. Franklin Blvd.	Gastonia	1-704-861-1668
Skully's Dive Shop	-	Gastonia	1-704-864-0097
Sunchasers Dive Center	2141 Walter Andrews Road	Graham	1-800-251-2777
Blue Dolphin Dive Center II	4725 High Point Road	Greensboro	1-336-632-9838
NADCO	4719 High Point Rd.	Greensboro	1-336-299-5533
Scuba Shack	-	Greensboro	1-336-854-3483
Aqua-Wholesale	Carolina East Centre	Greenville	1-252-321-2670
Blue Region Scuba	26 Carolina East Centre	Greenville	1-252-321-2670
Pamlico Divers	2225 N. Greene Street	Greenville	1-252-945-3725
Pelican Divers	PO Box 3768	Greenville	1-800-488-4220
Scuba Now	638C East Arlington Blvd	Greenville	1-252-565-8303
Gillam & Mason	PO Box 387, Hwy 45 North	Harrellsville	1-919-356-2874
Dive Hatteras	c/o Capt. Dave Sommers	Hatteras	1-703-517-3724/1-703-818-1850
Margie II	c/o Capt. Art Kirchner	Hatteras	1-201-361-3018
Outer Banks Diving & Charters	PO Box 453, 57540 Hwy. 12	Hatteras	1-252-986-1056
Cygnus Scuba	5990A Asheville Highway	Hendersonville	1-828-681-5330
Sea World Divers	7750 Woodland Hills	Hickory	1-828-397-6159
Triad Divers' Supply	144 Westchester Drive	High Point	1-336-886-8808
Neptune's Locker Diving Center	5820 Hwy 74 West	Indian Trail	1-704-684-0284
Bottom Time Dive Center	1713-A N. Marine Blvd	Jacksonville	1-800-52-SCUBA/1-910-347-2826
Crystal Coast Diving Adventures	713 New Bridge St	Jacksonville	1-800-843-4834
NC Scuba	Rt. 7, Box 380	Laurinburg	1-910-276-9302
The Diver's Edge	130 Covington Road	Lawndale	1-704-538-5755
Roanoke Island Dive Center	312 Hwy. 64	Manteo	1-252-473-1356
Divocean	c/o Capt. David Haskovec, P.O. Box 241	Marshallberg	1-252-726-3575
Matthews Water Sports	765 West John St.	Matthews	1-704-847-8998
Lake Norman Scuba	110 Charleston Dr., Suite 109	Mooresville	1-704-660-3483/704-663-8224 (fax)
Olympus Dive Center	PO Box 486, 713 Shepard St.	Morehead City	1-800-992-1258/1-252-726-9432
Sea Scan Dive Centre	2600 S Virginia Dare Trail	Nags Head	1-252-480-3467
Divin' Dawgs	2216 Trent Blvd	New Bern	1-252-638-3432/FAX: 252-637-1176
Dixon's Scuba	1400 Hwy 70E	New Bern	1-252-638-8682

Sandhills Scuba	180 Westgate Drive Suite 6	Pinehurst	(910) 295-5460/(910) 673-3292
Aquatic Specialties	-	Raleigh	1-919-851-6662
Bills Scuba	240 Newton Road	Raleigh	1-919-847-6169
Broadreach	200 S. West Street, Suite C	Raleigh	1-919-833-1907
Candler Swim & Gym Club	-	Raleigh	1-919-851-3635
Carolina Dive Center	5440 Atlantic Springs Rd., #10	Raleigh	1-919-341-2787
Diver Training Center	-	Raleigh	1-919-848-0529
Down Under Surf & Scuba	2857 Jones Franklin Road	Raleigh	1-919-852-5333
Gypsy Divers	3651 Bastion Lane	Raleigh	1-919-255-1931/1-800-591-1931
Reef & Ridge Sports	5209 Hillsborough Street	Raleigh	1-919-851-6662
Scuba Adventures	570 Malcolm Blvd	Rutherford College	1-828-368-0222
Mermaid Aquatics	-	Siler City	1-919-742-4124/1-800-366-3445
Scuba Tech	1306 Highway 172	Snead's Ferry	1-910-329-1666/877-973-6243
VisionQuest Dive Center Inc.	100 Camden Ct.	Sneads Ferry	1-910-327-0245/0787
Ocean Outfitters	-	Southport	1-910-457-4776
Scuba South Diving Company	222 South River Dr	Southport	1-910-457-5201
Southport Scuba	207 Yaupon Drive	Southport	-
Statesville Scuba	-	Statesville	1-980-224-3483
Swansboro Fish & Dive Tours	170 Piney Grove Church?Rd.	Swansboro	1-252--326-3073
Hydro-Con Ltd	108 Carmalt Street	Thomasville	1-910-476-9000
East Coast Discount	-	Top Sail Island	1-910-328-1887
Capital Scuba	3601-A Quarry Road	Wake Forest	1-919-570-3483
Ghost Fleet Dive Charters	212 Thicket Lump Road	Wanchese	1-252-423-0451
Reef Dancer Dive Center	—	Wilkesboro	1-336-903-8747
Aquatic Safaris & Divers Emporium	6800-1A Wrightsville Ave.	Wilmington	1-910-392-4386
Diversion Dive Charters	-	Wilmington	1-910-313-6965
Diving Carolina	-	Wilmington	1-866-214-3471
Maritime	-	Wilmington	1-910-350-0129
Offshore Adventures	-	Wilmington	1-910-799-2895
Scuba Now	5725 Oleander Drive, Unit A3	Wilmington	1-910-395-5111
Blue Dolphin Dive Center	3010 S. Stratford	Winston-Salem	1-336-760-9226
Rum Runner Dive Shop	4054 S. Memorial Dr., Unit O	Winterville	1-252-439-4390

APPENDIX C: Contact Email

Dear dive shop owner,

My name is J.P. Duncan, and I'm a graduate student at East Carolina University majoring in Sustainable Tourism (http://www.ecu.edu/cs-tecs/sustainabletourism/Sustainable-Tourism.cfm). My thesis research seeks to gain a better insight into the perspectives of scuba divers who dive on shipwrecks in North Carolina by surveying them about what they consider as acceptable diving behaviors when interacting with submerged cultural resources (which are important tourism sites).

I am seeking assistance in disseminating the web link to my online survey. I am seeking to do this by either gathering the email addresses of North Carolina shipwreck divers from dive shop contact lists, or by requesting that the survey link is passed onto dive shop clients by businesses such as your own. The link is provided below.

The results of this study are completely dependent upon the quality of feedback received as well as the number of respondents. It is my hope that this study will provide an accurate picture of divers' definitions of acceptable behaviors while on shipwreck dives in North Carolina. Per your request, the results will be shared with you. Potentially this is information that you could use as a dive shop in order to better serve your customers.

In addition, respondents who choose to enter their contact information will be entered into a drawing to win a $100 gas card, a $50 gas card, and a $20 gas card. Participation in this give away is completely voluntary, and results will not be linked to individual respondents.

The survey is now available and will end on August 11, 2014.

The survey should take approximately 10 minutes of someone's time. To take the survey, simply click on the link below or copy and paste the link into your browser.

https://www.surveymonkey.com/s/ncshipwreckdiving

If you have any questions or comments about the survey, please feel free to contact me at duncanj06@students.ecu.edu.
Thank you for taking the time to assist in disseminating this online questionnaire.

Sincerely,

J.P. Duncan
(336) 592-1958
MST Candidate
Center for Sustainable Tourism
East Carolina University
Greenville, North Carolina

APPENDIX D: Survey Instrument

Attitudes on Shipwreck Diving

1. Informed Consent Form

Thank you for agreeing to complete this survey. The survey is being conducted by East Carolina University's Center for Sustainable Tourism to gather information on your impressions and perceptions on sustainable shipwreck diving behavior in North Carolina. Tourism not only contributes to the economic base of communities but helps to preserve and cherish our culture and heritage, and diving contributes significantly to both.

We ask that you respond to the questions in this study by being as honest as possible. AS A THANK YOU FOR PARTICIPATING IN THIS SURVEY, YOU WILL BE ENTERED INTO A DRAWING FOR A GAS CARD (a grand prize of $100, a second prize of $50, and a third prize of $20). At the end of the survey, we ask for your contact information so that we can enter you in the drawing. This information will be stored separately from your survey responses so that they remain anonymous.

The questionnaire should take approximately 10 minutes of your time. Your participation in this study is voluntary and you may withdraw from the study at any time without penalty or loss of benefit. Your consent will be indicated by filling out the survey. There are no foreseeable risks to participating in the study. The results of this study may be published but no names will be used and individual responses will be maintained in confidence by the researchers. Anonymity and confidentiality will be assured.

Your participation will allow us to develop a greater understanding of divers' perceptions of sustainable shipwreck diving behavior in North Carolina. The information obtained from the survey will be used to guide future management practices of shipwrecks.

If you have any questions concerning this research study, please contact me at duncanj06@students.ecu.edu. For questions about your rights as a research participant, contact the Office of Research Integrity & Compliance (ORIC) at 252-744-2914 . Thank you in advance for taking the time to share your insights with us, and thank you for your continued efforts in making North Carolina a great place for shipwreck diving!

Thanks Again,

J.P. Duncan

2. Shipwreck Diving Experience

***1. Have you ever been scuba diving on a shipwreck in North Carolina?**

- ○ Yes
- ○ No

3. Diving Experience

In the following questions, please tell us about you scuba diving activity and experience. The information you provide will remain strictly confidential and your name will never be identified with your answers.

Attitudes on Shipwreck Diving

***2. Please enter your home zip/postal code.**

Zip/postal Code

3. From what agency do you hold a recreational diver certification? (Please select all that apply). ***If you are not a certified recreational diver, leave blank***

- [ ] NAUI (National Association of Underwater Instructors)
- [ ] PADI (Professional Association of Diving Instructors)
- [ ] SSI (Scuba Schools International)
- [ ] SDI (Scuba Diver International)

Other (please specify)

4. Under what standards were you certified as a scientific diver? ***If you are not a certified scientific diver, leave blank***

- [ ] AAUS (American Academy of Underwater Sciences)

Other (please specify)

5. From what agency do you hold a commercial diver certification? ***If you are not a certified commercial diver, leave blank***

- [ ] I hold commercial diver certification (list below)

Other (please specify)

6. Do you consider yourself a regular at a dive shop?

- ○ Yes
- ○ No

7. If yes to question 6, what is the zip code or town of the dive shop?

8. How many total years have you been scuba diving on shipwrecks?

Attitudes on Shipwreck Diving

9. How many times have you been diving on shipwrecks in the past 5 years?

10. Do you work with a maritime history or archaeological group?

- Yes
- No

4. Shipwreck Access and Boating

The next few questions ask you to rate how acceptable you find various actions associated with gaining access to shipwrecks while scuba diving.

11. Please indicate to what extent you believe you have an obligation to do or not to do the following actions when accessing a shipwreck.

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
It is okay to anchor on or in shipwreck structure	○	○	○	○	○	○	○
It is okay to anchor on sediment adjacent to a shipwreck	○	○	○	○	○	○	○
Only diving on a shipwreck with a mooring buoy or established anchor point is okay	○	○	○	○	○	○	○
Only live-boating (no anchor) when no other alternative is available is okay	○	○	○	○	○	○	○

5. Treatment of Shipwreck Structures

The next few questions ask you to rate how acceptable the listed actions below are when associated with the treatment of scuba divers of shipwreck structures.

Attitudes on Shipwreck Diving

12. Please indicate the extent to which you believe all scuba divers have an obligation to treat a shipwreck structure (e.g. frames and plates).

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely accecptable
It is okay to accidentally damage shipwreck structure (e.g. due to incorrect weighting)	○	○	○	○	○	○	○
It is okay to accidentally expose shipwreck structure (e.g. due to incorrect finning)	○	○	○	○	○	○	○
It is okay to deliberately damage shipwreck structure (e.g. vandalism)	○	○	○	○	○	○	○
It is okay to deliberately expose shipwreck structure (e.g. digging)	○	○	○	○	○	○	○
It is okay to deliberately remove shipwreck structure (e.g. collection)	○	○	○	○	○	○	○

6. Treatment of Shipwreck Features

The next few questions ask you to rate how acceptable you find various actions associated with the treatment of scuba divers of shipwreck features.

13. Please indicate the extent to which you believe all scuba divers have an obligation to treat shipwreck features (e.g. port holes and engines).

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely accecptable
It is okay to accidentally damage a shipwreck feature (e.g. due to incorrect weighting)	○	○	○	○	○	○	○
It is okay to accidentally expose a shipwreck feature (e.g. incorrect finning)	○	○	○	○	○	○	○
It is okay to deliberately damage a shipwreck feature (e.g. vandalism)	○	○	○	○	○	○	○
It is okay to deliberately expose a shipwreck feature (e.g. digging)	○	○	○	○	○	○	○
It is okay to deliberately remove a shipwreck feature (e.g. collection)	○	○	○	○	○	○	○

7. Treatment of Surface Artifacts

Attitudes on Shipwreck Diving

The next few questions ask you to rate how acceptable you find various actions associated with the treatment of scuba divers of surface artifacts (i.e. unburied or uncovered artifacts.

14. Please indicate the extent to which you believe all scuba divers have an obligation to treat surface artifacts (e.g. artifacts exposed on sediments).

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
It is okay to accidentally dislodge or disturb artifacts inside a shipwreck (no handling)	○	○	○	○	○	○	○
It is okay to accidentally dislodge or disturb artifacts adjacent to a shipwreck	○	○	○	○	○	○	○
It is okay to accidentally dislodge or disturb artifacts away from a shipwreck (i.e. in debris field)	○	○	○	○	○	○	○
It is okay to handle and return artifacts from inside a shipwreck to its same location	○	○	○	○	○	○	○
It is okay to handle and return artifacts from adjacent a shipwreck to its same location	○	○	○	○	○	○	○
It is okay to handle and return artifacts from outside a shipwreck to its same location	○	○	○	○	○	○	○
It is okay to move artifacts from inside a wreck to a new location	○	○	○	○	○	○	○
It is okay to move artifacts adjacent to a wreck to a new location	○	○	○	○	○	○	○
It is okay to move artifacts away from a wreck to a new location	○	○	○	○	○	○	○
It is okay to collect and remove artifacts from inside shipwreck	○	○	○	○	○	○	○
It is okay to collect and remove artifacts adjacent to a shipwreck	○	○	○	○	○	○	○
It is okay to collect and remove artifacts away from a shipwreck	○	○	○	○	○	○	○

8. Treatment of Buried Artifacts

Attitudes on Shipwreck Diving

The next few questions ask you to rate how acceptable you find various actions associated with the treatment of scuba divers of buried artifacts (i.e. partially or totally covered with sediment).

15. Please indicate the extent to which you believe all scuba divers have an obligation to treat buried artifacts (e.g. artifacts mostly beneath sediments).

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely accecptable
It is okay to accidentally disturb sediments inside a shipwreck, exposing artifacts	○	○	○	○	○	○	○
It is okay to accidentally disturb sediments adjacent to a shipwreck, exposing artifacts	○	○	○	○	○	○	○
It is okay to accidentally disturb sediments away from a shipwreck, exposing artifacts	○	○	○	○	○	○	○
It is okay to excavate, handle, and return artifacts from inside a shipwreck to its same location	○	○	○	○	○	○	○
It is okay to excavate, handle, and return artifacts from adjacent a shipwreck to its same location	○	○	○	○	○	○	○
It is okay to excavate, handle, and return artifacts from away a shipwreck to its same location	○	○	○	○	○	○	○
It is okay to excavate, handle, and return artifacts from inside shipwreck to a new location	○	○	○	○	○	○	○
It is okay to excavate, handle, and return artifacts from adjacent shipwreck to new location	○	○	○	○	○	○	○
It is okay to excavate, handle, and return artifacts from away from shipwreck to new location	○	○	○	○	○	○	○
It is okay to collect and remove artifacts from inside shipwreck	○	○	○	○	○	○	○
It is okay to collect and remove artifacts adjacent to a shipwreck	○	○	○	○	○	○	○

Attitudes on Shipwreck Diving

It is okay to collect and remove artifacts away from a shipwreck	○	○	○	○	○	○	○

16. During a typical dive on a shipwreck, how acceptable is it for you to see the following number of artifacts collected? (Please circle one number for each of the following items).

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
Zero artifacts	○	○	○	○	○	○	○
5 artifacts	○	○	○	○	○	○	○
10 artifacts	○	○	○	○	○	○	○
15 artifacts	○	○	○	○	○	○	○
20 artifacts	○	○	○	○	○	○	○
25 artifacts	○	○	○	○	○	○	○
More than 25 artifacts	○	○	○	○	○	○	○

9. Penetration of Wrecks

The next few questions ask you to rate how acceptable you find various actions related to the penetration of shipwrecks by scuba divers.

17. Please indicate the extent to which you believe all scuba divers have an obligation to behave when they penetrate a shipwreck.

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
It is okay to penetrate a shipwreck	○	○	○	○	○	○	○
It is okay to penetrate a wreck on open-circuit scuba (exhaled air accumulates inside wreck)	○	○	○	○	○	○	○
It is okay to penetrate a wreck on closed-circuit rebreather (little to no air accumulates inside wreck)	○	○	○	○	○	○	○

10. About You

Below are just a few questions that will help us improve our understanding of shipwreck scuba divers in North Carolina. Participation is voluntary, so please answer only what you feel comfortable responding to.

Attitudes on Shipwreck Diving

18. Gender:

- Male
- Female

19. Of what race/ethnicity do you consider yourself?

- African American or Black
- Asian
- Mixed Race
- Caucasian or White
- Other
- Hispanic, Latino, or Spanish Origin
- American Indian or Alaska Native

20. What is your age?

- 18 - 30 years old
- 31 - 40 years old
- 41 - 50 years old
- 51 - 60 years old
- 61 - 70 years old
- Over 70 years old

21. Please check the option that best describes your employment status.

- Self-employed
- Employed in the private sector
- Employed in the public sector
- Employed in the non-profit sector
- Retired
- Student
- Unemployed

Attitudes on Shipwreck Diving

22. What is your household income range?

- $1,000 - $49,000
- $50,000 - $99,000
- $100,000- $149,000
- $150,000 -$199,000
- $200,000 - $249,000
- Over $250,000

23. What is your highest level of education attained?

- Some high school/high school
- Some college/Associate's degree
- Professional/Trade degree
- Bachelor's degree
- Graduate degree
- MD/JD

11. THANK YOU!!

24. Thank you for taking the shipwreck diving survey!

If you have any comments about this survey or about shipwreck diving in North Carolina, please elaborate in the space below.

APPENDIX E: Loomis Survey Instrument

In the following questions, please tell us about your snorkeling and SCUBA diving activity and experience. The information you provide will remain strictly confidential and your name will never be identified with your answers.

1. **Consider the time you spend snorkeling and SCUBA diving in general, regardless of location. Between the two, what percentage of time do you spend snorkeling and what percentage of time do you spend SCUBA diving? (The percentages of time for snorkeling and for SCUBA diving combined should equal 100%).**

   a. Percent of time snorkeling _____ %

   b. Percent of time SCUBA diving _____ %

   Total = 100%

2. **If you are a SCUBA diver, what level of certification do you presently hold? (Please circle all that apply).**

   1 None - I am not a SCUBA diver
   2 Enrolled in SCUBA diving course
   3 Open Water
   4 Advanced
   5 Dive Master
   6 Instructor
   7 Other (please list)_____

We understand that you may be both a snorkeler and a SCUBA diver, but in the following section we are interested in learning about your <u>primary activity</u>. Please answer questions #4 through #22 based on your response to <u>QUESTION #3</u> below.

3. **In general, do you identify yourself as more of a snorkeler or more of a SCUBA diver? (Please circle only one response, and answer questions #4 through #22 based on your response to this question).**

   1 Snorkeler

   2 SCUBA diver

4. **With whom do you snorkel/SCUBA dive most often? Again answer questions #4 through #22 based on your response to question #3. (Please circle only one answer).**

1 By myself
2 With friends
3 With family
4 With family and friends

5. **How many total years have you been snorkeling/SCUBA diving on coral reefs? (In adding up the total number of years, please exclude years that you did not go snorkeling/SCUBA diving).**

_____ Total years snorkeling/SCUBA diving

6. **During the past 12 months, approximately how many days did you go snorkeling/ SCUBA diving on coral reefs in the Florida Keys?**

_____ Days snorkeling/SCUBA diving

7. **During the past 12 months, how many days did you go snorkeling/SCUBA diving on a coral reef in the Florida Keys on a private boat (owned and captained by yourself or a friend), on a rented boat (captained by yourself or a friend), or on a hired boat (owned and captained by a dive company)?**

_____ Number of days to a reef on a private boat

_____ Number of days to a reef on a rented boat

_____ Number of days to a reef on a for-hire boat

8. **Would you say the number of days you went snorkeling/SCUBA diving on coral reefs in the Florida Keys this past year was less, about the same, or more than in the previous five years?**

1 Less
2 About the same
3 More
4 I've only gone once

9. **How important is it to you to snorkel/SCUBA dive on coral reefs as opposed to other locations (such as wrecks, sand flats, and seagrass beds)?**

1 Not at all important
2 Somewhat important
3 Moderately important
4 Very important
5 Extremely important

10. **To what extent do you make use of the following for current information about snorkeling/SCUBA diving in the Florida Keys?**

	No use	Almost no use	A little use	Some use	A lot of use
a. Talking with other snorkelers/divers	1	2	3	4	5
b. Diving/snorkeling magazines	1	2	3	4	5
c. Government agency publications	1	2	3	4	5
d. Conservation organization publications	1	2	3	4	5
e. Newspapers	1	2	3	4	5
f. Dive shops/companies	1	2	3	4	5
g. Club meetings	1	2	3	4	5
h. Television	1	2	3	4	5
i. Radio	1	2	3	4	5

11. **To what extent did you <u>expect</u> to be able to do each of the following on your most recent trip to a reef in the Florida Keys?**

	Did not expect	Small expectation	Moderate expectation	Large expectation	Very large expectation
a. To see a healthy reef	1	2	3	4	5
b. To experience easy snorkeling/SCUBA diving conditions	1	2	3	4	5
c. To experience good underwater conditions	1	2	3	4	5
d. To see undamaged reef sites	1	2	3	4	5
e. To see marine life (other than fish)	1	2	3	4	5
f. To see large fish	1	2	3	4	5
g. To see unique underwater formations	1	2	3	4	5
h. To see live coral	1	2	3	4	5
i. To experience natural surroundings	1	2	3	4	5
j. To relax.	1	2	3	4	5

12. During a typical trip to a coral reef in the Florida Keys, what is the maximum number of:

a. SCUBA divers you find acceptable to see at any one moment during your time in the water? _____

b. snorkelers you find acceptable to see at any one moment during your time in the water? _____

c. boats you find acceptable to see at any one moment during your time at a snorkel/dive site? _____

The next several questions ask you to indicate how important snorkeling/SCUBA diving is as a part of your life, regardless of location. For each question below, read the four choices and circle the one answer that best fits you for that question. Again, please answer the following questions based on your primary activity (i.e., the response you gave to QUESTION #3 on page 2).

13. When I participate in the sport of snorkeling/SCUBA diving I feel like:

1 a beginner. I don't really feel like I am part of the snorkeling/SCUBA diving scene.
2 an occasional or irregular participant. Sometimes it is fun, entertaining or rewarding to go snorkeling/SCUBA diving.
3 a habitual and regular participant in the sport of snorkeling/SCUBA diving.
4 an insider to the sport. Snorkeling/SCUBA diving is an important part of who I am.

14. During a snorkeling/SCUBA diving experience I can best be described as:

1 having very little understanding of the sport. I am often unsure of how to do certain things when I go snorkeling/SCUBA diving.
2 having some understanding of the sport, but I am still in the process of learning more about the sport. I am becoming familiar and comfortable with the activity.
3 being comfortable with the sport. I have a good understanding of what I can do while snorkeling/SCUBA diving, and how to do it.
4 a knowledgeable expert in the sport. I encourage, teach, and enhance opportunities for others who are interested in snorkeling/SCUBA diving.

15. My relationships with others who snorkel/SCUBA dive are:

1 not established. I really don't know any other people who snorkel/SCUBA dive.
2 very limited. I know some other snorkelers/SCUBA divers by sight and sometimes talk with them, but I don't know their names.
3 one of familiarity. I know the names of others who snorkel/SCUBA dive, and often speak with them.
4 close. I have personal and close relationships with other snorkelers/SCUBA divers. These friendships often revolve around the sport.

16. My commitment to snorkeling/SCUBA diving is:

1 very slight. I have very little connection to the sport. I may or may not continue to participate in the sport in the future.
2 moderate. I will continue to go snorkeling/SCUBA diving as long as it is entertaining and provides the benefits I want.
3 fairly strong. I have a sense of being a member of the sport, and it is likely that I will continue to snorkel/SCUBA dive for a long time.
4 very strong. I am totally committed to snorkeling/SCUBA diving. I encourage others to participate in the sport and seek to ensure the activity continues into the future.

The next several questions ask you to rate how acceptable you find various snorkeling/SCUBA diving situations to be. For each of the following questions, please circle one number for each of the items listed. Again, please answer the following items based on the response you gave to <u>QUESTION #3</u> on page 2.

17. **During a typical snorkel/SCUBA dive on a coral reef in the Florida Keys, how acceptable is it for you to see the following number of <u>divers</u> at <u>any one moment</u> during your time in the water? (Please circle one number for each of the following items).**

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
a. Zero SCUBA divers	1	2	3	4	5	6	7
b. 5 SCUBA divers	1	2	3	4	5	6	7
c. 10 SCUBA divers	1	2	3	4	5	6	7
d. 15 SCUBA divers	1	2	3	4	5	6	7
e. 20 SCUBA divers	1	2	3	4	5	6	7
f. 25 SCUBA divers	1	2	3	4	5	6	7
g. More than 25 SCUBA divers	1	2	3	4	5	6	7

18. **During a typical snorkel/SCUBA dive on a coral reef in the Florida Keys, how acceptable is it for you to see the following number of <u>snorkelers</u> at <u>any one moment</u> during your time in the water?**

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
a. Zero snorkelers	1	2	3	4	5	6	7
b. 5 snorkelers	1	2	3	4	5	6	7
c. 10 snorkelers	1	2	3	4	5	6	7
d. 15 snorkelers	1	2	3	4	5	6	7
e. 20 snorkelers	1	2	3	4	5	6	7
f. 25 snorkelers	1	2	3	4	5	6	7
g. More than 25 snorkelers	1	2	3	4	5	6	7

19. During a typical snorkel/SCUBA dive on a coral reef in the Florida Keys, how acceptable is it for you to see the following number of <u>boats</u> at <u>any one moment</u> during your time at a dive site?

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
a. Zero boats	1	2	3	4	5	6	7
b. 5 boats	1	2	3	4	5	6	7
c. 10 boats	1	2	3	4	5	6	7
d. 15 boats	1	2	3	4	5	6	7
e. 20 boats	1	2	3	4	5	6	7
f. 25 boats	1	2	3	4	5	6	7
g. More than 25 boats	1	2	3	4	5	6	7

20. During a typical snorkel/SCUBA dive on a coral reef in the Florida Keys, how acceptable or unacceptable do you consider each of the following resource conditions to be?

	Extremely unacceptable	Very unacceptable	Somewhat unacceptable	Not sure	Somewhat acceptable	Very acceptable	Extremely acceptable
a. Coral reefs that are mostly white	1	2	3	4	5	6	7
b. Coral reefs that are 60% white	1	2	3	4	5	6	7
c. Coral reefs that are 30% white	1	2	3	4	5	6	7
d. Reefs with no white coral present	1	2	3	4	5	6	7
e. Nearly 100% algal cover	1	2	3	4	5	6	7
f. 60% algal cover	1	2	3	4	5	6	7
g. 30% algal cover	1	2	3	4	5	6	7
h. Almost no algae present	1	2	3	4	5	6	7
i Visibility of about 10 feet	1	2	3	4	5	6	7
j. Visibility of about 25 feet	1	2	3	4	5	6	7
k. Visibility of about 50 feet	1	2	3	4	5	6	7
l. Visibility of about 75 feet	1	2	3	4	5	6	7
m. Seeing no fish at the reef site	1	2	3	4	5	6	7
n. Seeing many fish, but of few kinds	1	2	3	4	5	6	7
o. Seeing few fish, but of many kinds	1	2	3	4	5	6	7
p. Seeing many fish, of many kinds	1	2	3	4	5	6	7

21. Please indicate the extent to which you believe all snorkelers/SCUBA divers have an obligation either to do or to not do each of the following at a coral reef.

	Strong obligation to never do	Moderate obligation to not do	Slight obligation to not do	No obligation either way	Slight obligation to do	Moderate obligation to do	Strong obligation to always do
a. Maintain buoyancy control	1	2	3	4	5	6	7
b. Tell others not to touch corals	1	2	3	4	5	6	7
c. Operate boats in shallow reef areas	1	2	3	4	5	6	7
d. Feed fish	1	2	3	4	5	6	7
e. Swim close to marine mammals	1	2	3	4	5	6	7
f. Touch marine mammals	1	2	3	4	5	6	7
g. Pick up garbage from the sea floor	1	2	3	4	5	6	7
h. Operate boats at least 100 feet from a dive flag	1	2	3	4	5	6	7
i. Take pieces of dead coral	1	2	3	4	5	6	7
j. Break off pieces of live coral	1	2	3	4	5	6	7
k. Leave shells in original locations on a reef	1	2	3	4	5	6	7
l. Tell others not to anchor boats on coral	1	2	3	4	5	6	7

22. Imagine that you did the following at a coral reef and others saw you. How embarrassed would you feel?

	Not at all embarrassed	Somewhat embarrassed	Moderately embarrassed	Very embarrassed	Extremely embarrassed
a. Lost buoyancy control	1	2	3	4	5
b. Touched corals with your hands	1	2	3	4	5
c. Operated a boat in a shallow reef area	1	2	3	4	5
d. Fed fish	1	2	3	4	5
e. Swam close to marine mammals	1	2	3	4	5
f. Touched marine mammals	1	2	3	4	5
g. Left garbage on the sea floor	1	2	3	4	5
h. Operated a boat too close to a dive flag	1	2	3	4	5
i. Took pieces of dead coral	1	2	3	4	5
j. Broke off pieces of live coral	1	2	3	4	5
k. Removed shells from a reef	1	2	3	4	5
l. Knowingly anchored a boat on coral	1	2	3	4	5

In the following section, we are interested in learning more about the activity you engaged in on your <u>most recent trip</u> to the Florida Keys. Please answer the following questions based on the response you give to <u>QUESTION #23</u> below.

23. On your <u>most recent trip</u> to a coral reef in the Florida Keys, did you spend more time snorkeling or SCUBA diving? (Please circle one response).

1 Snorkeling

2 SCUBA diving

24. To what extent were you <u>able to accomplish</u> each of the following during your <u>most recent</u> snorkel/SCUBA dive on a coral reef in the Florida Keys?

	Completely unable to accomplish	Slightly able to accomplish	Moderately able to accomplish	Mostly able to accomplish	Completely able to accomplish
a. To see a healthy reef	1	2	3	4	5
b. To experience easy snorkel/SCUBA conditions	1	2	3	4	5
c. To experience good underwater visibility	1	2	3	4	5
d. To see undamaged reef sites	1	2	3	4	5
e. To see marine life	1	2	3	4	5
f. To see large fish	1	2	3	4	5
g. To see unique underwater formations	1	2	3	4	5
h. To see live coral	1	2	3	4	5
i. To experience natural surroundings	1	2	3	4	5
j. To relax	1	2	3	4	5

25. On your <u>most recent trip</u> to a coral reef in the Florida Keys, about how many other <u>snorkelers and SCUBA divers</u> did you <u>expect</u> to see at <u>any one moment</u> while you were actually snorkeling/diving in the water? (If you didn't know what to expect, please check that box).

_____ Number of snorkelers ☐ I didn't know what to expect

_____ Number of SCUBA divers ☐ I didn't know what to expect

26. **On your <u>most recent trip</u> to a coral reef in the Florida Keys, about how many other <u>boats</u> did you <u>expect</u> to see at <u>any one moment</u> during your time at a dive site?**

_____ Number of boats ☐ I didn't know what to expect

27. **Included is a map of the Florida Keys. It is divided into three regions (upper, middle, and lower Keys). Within each region are three additional areas arranged outward from the shore to the reefs. Thus, there are a total of nine unique zones on the map. Please review the map and 1) record below the zone number for where you visited on your most recent snorkeling/SCUBA diving trip to the Keys, and 2) with an X, mark <u>on the map</u> the specific location of your visit, if possible. <u>Please return the map with your survey</u>.**

Zone number _____

28. **Below is a list of coral reef characteristics that you may notice while snorkeling/ SCUBA diving. Consider your <u>most recent</u> snorkeling/SCUBA diving experience at a coral reef in the Florida Keys and <u>rate the condition of the reef</u> for each of the following items.**

	Extremely poor condition	Very poor condition	Poor condition	Average condition	Good condition	Very good condition	Extremely good condition
a. Amount of algae	1	2	3	4	5	6	7
b. Underwater visibility	1	2	3	4	5	6	7
c. Color of the coral	1	2	3	4	5	6	7
d. Number of fish	1	2	3	4	5	6	7
e. Different kinds of fish	1	2	3	4	5	6	7
f. Size of fish	1	2	3	4	5	6	7
g. Amount of coral disease	1	2	3	4	5	6	7
h. Amount of live coral	1	2	3	4	5	6	7
i. Size of corals	1	2	3	4	5	6	7
j. Different kinds of coral	1	2	3	4	5	6	7

29. **Please indicate below how crowded you felt on-site during your <u>most recent trip</u> to a coral reef in the Florida Keys. (Please circle only one number).**

1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6 ..... 7 ..... 8 9

Not at all crowded Extremely crowded

30. If asked by a friend whether he/she should snorkel or dive on the coral reef you visited on your <u>most recent trip</u> to the Florida Keys, what advice would you give?

1 Strongly advise against
2 Advise against
3 Not sure
4 Recommend
5 Strongly recommend

31. If you were to snorkel or dive in the Florida Keys again, would <u>you</u> return to the coral reef you visited on your <u>most recent trip</u>?

1 Definitely not
2 Probably not
3 Not sure
4 Maybe
5 Definitely

32. How <u>satisfied</u> were you with each of the following during your <u>most recent</u> snorkel/SCUBA dive on a coral reef in the Florida Keys?

	Not at all satisfied	Slightly satisfied	Moderately satisfied	Very satisfied	Extremely satisfied
a. Seeing a healthy reef	1	2	3	4	5
b. Experiencing easy snorkeling/SCUBA diving conditions	1	2	3	4	5
c. Experiencing good underwater visibility	1	2	3	4	5
d. Seeing undamaged reef sites	1	2	3	4	5
e. Seeing marine life	1	2	3	4	5
f. Seeing large fish	1	2	3	4	5
g. Seeing unique underwater formations	1	2	3	4	5
h. Seeing live coral	1	2	3	4	5
i. Experiencing natural surroundings	1	2	3	4	5
j. Relaxing.	1	2	3	4	5

33. **On your <u>most recent visit</u> to a coral reef in the Florida Keys, about how many other <u>snorkelers and SCUBA divers</u> do you remember seeing <u>at any one moment</u> when you were actually snorkeling/SCUBA diving in the water?**

_____ Number of snorkelers

_____ Number of SCUBA divers

34. **On your <u>most recent visit</u> to a coral reef in the Florida Keys, about how many other <u>boats</u> do you remember actually seeing <u>at any one moment</u> during your time at a dive site?**

_____ Number of boats

35. **Overall, do you feel the following are having a positive or negative impact on the ecological health of coral reefs in the Florida Keys?**

	Extremely negative impact	Moderately negative impact	Slightly negative impact	No positive or negative impact	Slightly positive impact	Moderately positive impact	Extremely positive impact
a. Water quality	1	2	3	4	5	6	7
b. SCUBA diving	1	2	3	4	5	6	7
c. Commercial fishing	1	2	3	4	5	6	7
d. Hurricanes	1	2	3	4	5	6	7
e. Snorkeling	1	2	3	4	5	6	7
f. Recreational fishing	1	2	3	4	5	6	7
g. Global climate change	1	2	3	4	5	6	7

36. **Overall, how would you rate the current ecological health of the coral reefs in the Florida Keys?**

1 Poor
2 Fair
3 Good
4 Very good
5 Excellent

37. Do you feel that the ecological health of the coral reefs in the Florida Keys is improving, declining, or staying the same?

1 Declining substantially
2 Declining somewhat
3 Staying the same
4 Improving somewhat
5 Improving substantially

38. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a. Coral reefs in the Florida Keys are able to easily recover from any impacts due to snorkeling/diving without any long-term damage	1	2	3	4	5
b. Coral reefs in the Florida Keys are able to easily recover from any impacts due to commercial fishing without any long-term damage	1	2	3	4	5
c. Coral reefs in the Florida Keys are generally in a healthy condition	1	2	3	4	5
d. Snorkelers/divers cause some damage to reefs in the Florida Keys, which has long-lasting effects on reef health	1	2	3	4	5
e. Recreational anglers cause some damage to reefs in the Florida Keys, which has long-lasting effects on reef health	1	2	3	4	5
f. The Florida Keys reefs where I typically snorkel or dive are in a healthy condition	1	2	3	4	5

39. If you had to replace the snorkeling/SCUBA diving equipment that you currently own with similar equipment, how much would it cost to replace? Please indicate the amount for your primary activity, as you indicated in QUESTION #3 on page 2. (Only include equipment that is directly used during snorkeling/SCUBA diving; exclude supplemental items like boats, trailers, etc.).

$_____ Amount to replace snorkeling/SCUBA diving equipment

The following questions will help us improve our understanding of snorkelers and SCUBA divers in the Florida Keys. The information you provide will remain strictly confidential. Your name will never be associated with your answers.

40. Are you a permanent or seasonal resident of Monroe County, Florida?

1 Yes, I am a permanent resident of Monroe County, FL
2 Yes, I am a seasonal resident of Monroe County, FL
3 No, I am a visitor to Monroe County, FL

41. What is your age? _____ Years

42. Are you:

1 Male
2 Female

43. What is your marital status?

1 Single
2 Married
3 Divorced
4 Separated
5 Widowed

44. Which of the following categories best describes your annual household income?

1	Under $5,000	9	$40,000 to $44,999
2	$5,000 to $9,999	10	$45,000 to $49,999
3	$10,000 to $14,999	11	$50,000 to $59,999
4	$15,000 to $19,999	12	$60,000 to $74,999
5	$20,000 to $24,999	13	$75,000 to $99,999
6	$25,000 to $29,999	14	$100,000 to $149,999
7	$30,000 to $34,999	15	$150,000 or More
8	$35,000 to $39,999		

45. Would you classify yourself as Spanish/Hispanic/Latino?

1 Yes
2 No

46. Which racial category best describes you?

1 American Indian or Native Alaskan
2 Asian
3 Black or African American
4 Native Hawaiian or other Pacific Islander
5 White

Is there anything else about snorkeling or diving in the Florida Keys that you would like to share with us?

_____

_____

_____

_____

_____

Your contribution to this effort is greatly appreciated. Please return your completed questionnaire and map in the enclosed postage paid business reply envelope as soon as possible. Thank you.

Please direct all inquiries to:
David K. Loomis
University of Massachusetts Amherst
Holdsworth Natural Resources Center
Amherst, MA 01003-9285

Questionnaire # 16

APPENDIX F: Means and Standard Deviations of Sustainable Actions by Gender

	Gender			
	Female (n=19)		Male (n=49)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Anchor to Structure	3.76	2.1	3.11	2.05
Anchor in Sediment	4.86	1.84	4.84	1.74
Only Anchor to Mooring Buoy	4.57	2.12	4.89	2.11
Only Live-Boating, No Anchor	4.06	2.01	4.37	2.09
Accidentally Damage Structure	2.45	1.56	2.47	1.71
Accidentally Expose Structure	2.90	1.67	2.79	1.81
Deliberately Damage Structure	1.59	1.53	1.58	1.61
Deliberately Expose Structure	2.73	2.15	2.11	2.13
Deliberately Remove Structure	2.65	2.18	1.68	1.89
Accidentally Damage Feature	2.65	1.56	2.37	1.77
Accidentally Expose Feature	2.96	1.59	2.58	1.77
Deliberately Damage Feature	1.53	1.32	1.63	1.54
Deliberately Expose Feature	2.63	2.04	2.05	2.12
Deliberately Remove Feature	2.51	2.11	1.79	1.90
Accidentally Disturb Artifacts Inside Wreck	3.12	1.83	2.53	1.87
Accidentally Disturb Artifact Adjacent to Wreck	3.27	1.85	2.84	1.89
Accidentally Disturb Artifacts Away From Wreck	3.49	2.01	3.00	1.94
Handle Artifacts Inside Wreck	3.59	2.21	2.53	1.81
Handle Artifacts Adjacent to Wreck	3.76	2.24	2.63	1.89
Handle Artifacts Outside of Wreck	3.73	2.17	2.63	1.89
Move Artifacts Inside of Wreck	2.51	1.93	2.05	1.84
Move Artifacts Adjacent to Wreck	2.73	2.10	2.11	1.85
Move Artifacts Away From Wreck	2.63	1.99	2.26	2.13
Remove Artifacts from Inside of Wreck	2.80	2.27	2.00	2.11
Remove Artifacts Adjacent to Wreck	2.90	2.23	1.84	1.80
Remove Artifacts Away From Wreck	3.02	2.29	2.00	2.11
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.53	1.83	2.79	1.81
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.65	1.83	3.00	1.83
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.69	1.83	3.16	1.80
Excavate, handle, and return Artifacts from Inside of Wreck to same location	3.24	2.01	2.21	1.65
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	3.35	2.01	2.32	1.77
Excavate, handle, and return Artifacts Away From Wreck to same location	3.39	2.05	2.37	1.77
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	2.65	2.04	2.11	1.91
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	2.73	2.05	1.89	1.59

	Female (n=19)		Male (n=49)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Excavate, handle, and return Artifacts Away From Wreck to New Location	2.82	2.05	2.05	1.93
Collect Buried Artifacts Inside of Wreck	2.88	2.2	2.16	2.09
Collect Buried Artifacts Adjacent to Wreck	2.9	2.19	2.16	2.09
Collect Buried Artifacts Away From Wreck	3.06	2.22	2.16	2.09
Okay to Penetrate Wreck	5.78	1.18	5.53	1.02
Okay to Penetrate Wreck on Open-Circuit Scuba	5.39	1.29	4.89	1.52
Okay to Penetrate Wreck on Closed-Circuit rebreather	5.96	1.02	5.53	1.61

APPENDIX G: T-test Statistics for Gender

Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Anchor to Structure	Equal variances assumed	.345	.559	1.153	66	.253
	Equal variances not assumed			1.165	33.471	.252
Anchor in Sediment	Equal variances assumed	.096	.758	.031	66	.976
	Equal variances not assumed			.031	34.498	.975
Only Anchor to Mooring Buoy	Equal variances assumed	.000	.989	-.565	66	.574
	Equal variances not assumed			-.567	33.040	.575
Only Live-Boating, No Anchor	Equal variances assumed	.043	.836	-.559	66	.578
	Equal variances not assumed			-.550	31.797	.586
Accidentally Damage Structure	Equal variances assumed	.000	.991	-.057	66	.955
	Equal variances not assumed			-.055	30.210	.957
Accidentally Expose Structure	Equal variances assumed	.156	.694	.234	66	.815
	Equal variances not assumed			.226	30.613	.823
Deliberately Damage Structure	Equal variances assumed	.002	.962	.031	66	.976
	Equal variances not assumed			.030	31.315	.976
Deliberately Expose Structure	Equal variances assumed	.314	.577	1.086	66	.281
	Equal variances not assumed			1.090	33.050	.284
Deliberately Remove Structure	Equal variances assumed	5.344	.024	1.707	66	.093
	Equal variances not assumed			1.818	37.581	.077
Accidentally Damage Feature	Equal variances assumed	.025	.874	.650	66	.518
	Equal variances not assumed			.614	29.497	.544

Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Accidentally Expose Feature	Equal variances assumed	.174	.678	.855	66	.395
	Equal variances not assumed			.815	29.933	.421
Deliberately Damage Feature	Equal variances assumed	.218	.642	-.270	66	.788
	Equal variances not assumed			-.253	28.985	.802
Deliberately Expose Feature	Equal variances assumed	.195	.660	1.041	66	.302
	Equal variances not assumed			1.023	31.679	.314
Deliberately Remove Feature	Equal variances assumed	3.571	.063	1.296	66	.199
	Equal variances not assumed			1.358	36.222	.183
Accidentally Disturb Artifacts Inside Wreck	Equal variances assumed	.147	.703	1.197	66	.235
	Equal variances not assumed			1.188	32.279	.244
Accidentally Disturb Artifact Adjacent to Wreck	Equal variances assumed	.116	.734	.842	66	.403
	Equal variances not assumed			.833	32.079	.411
Accidentally Disturb Artifacts Away From Wreck	Equal variances assumed	1.106	.297	.909	66	.367
	Equal variances not assumed			.923	33.867	.362
Handle Artifacts Inside Wreck	Equal variances assumed	5.987	.017	1.873	66	.066
	Equal variances not assumed			2.046	39.862	.047
Handle Artifacts Adjacent to Wreck	Equal variances assumed	4.577	.036	1.932	66	.058
	Equal variances not assumed			2.083	38.628	.044
Handle Artifacts Outside of Wreck	Equal variances assumed	3.632	.061	1.947	66	.056
	Equal variances not assumed			2.069	37.362	.046

Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Move Artifacts Inside of Wreck	Equal variances assumed	.621	.433	.889	66	.377
	Equal variances not assumed			.908	34.242	.370
Move Artifacts Adjacent to Wreck	Equal variances assumed	1.057	.308	1.144	66	.257
	Equal variances not assumed			1.210	36.949	.234
Move Artifacts Away From Wreck	Equal variances assumed	.000	.989	.675	66	.502
	Equal variances not assumed			.654	30.867	.518
Remove Artifacts from Inside of Wreck	Equal variances assumed	2.815	.098	1.321	66	.191
	Equal variances not assumed			1.366	35.200	.181
Remove Artifacts Adjacent to Wreck	Equal variances assumed	4.141	.046	1.842	66	.070
	Equal variances not assumed			2.023	40.339	.050
Remove Artifacts Away From Wreck	Equal variances assumed	2.445	.123	1.686	66	.097
	Equal variances not assumed			1.748	35.405	.089
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Equal variances assumed	1.140	.290	1.504	66	.137
	Equal variances not assumed			1.509	33.046	.141
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Equal variances assumed	.980	.326	1.320	66	.191
	Equal variances not assumed			1.322	32.917	.195
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Equal variances assumed	.743	.392	1.089	66	.280
	Equal variances not assumed			1.096	33.227	.281

Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Excavate, handle, and return	Equal variances assumed	3.077	.084	1.998	66	.050
Artifacts from Inside of Wreck to same location	Equal variances not assumed			2.177	39.587	.036
Excavate, handle, and return	Equal variances assumed	1.867	.176	1.964	66	.054
Artifacts Adjacent to Wreck to same location	Equal variances not assumed			2.078	37.046	.045
Excavate, handle, and return	Equal variances assumed	1.793	.185	1.907	66	.061
Artifacts Away From Wreck to same location	Equal variances not assumed			2.036	37.746	.049
Excavate, handle, and return	Equal variances assumed	.923	.340	1.012	66	.315
Artifacts from Inside of Wreck to New Location	Equal variances not assumed			1.041	34.801	.305
Excavate, handle, and return	Equal variances assumed	3.136	.081	1.605	66	.113
Artifacts from Adjacent to Wreck to New Location	Equal variances not assumed			1.793	41.968	.080
Excavate, handle, and return	Equal variances assumed	.901	.346	1.402	66	.166
Artifacts Away From Wreck to New Location	Equal variances not assumed			1.440	34.698	.159

Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Collect Buried Artifacts Inside of Wreck	Equal variances assumed	2.062	.156	1.225	66	.225
	Equal variances not assumed			1.255	34.495	.218
Collect Buried Artifacts Adjacent to Wreck	Equal variances assumed	1.875	.175	1.266	66	.210
	Equal variances not assumed			1.293	34.301	.205
Collect Buried Artifacts Away From Wreck	Equal variances assumed	2.057	.156	1.529	66	.131
	Equal variances not assumed			1.572	34.743	.125
Okay to Penetrate Wreck	Equal variances assumed	.037	.847	.811	66	.420
	Equal variances not assumed			.865	37.625	.393
Okay to Penetrate Wreck on Open-Circuit Scuba	Equal variances assumed	.635	.428	1.345	66	.183
	Equal variances not assumed			1.248	28.535	.222
Okay to Penetrate Wreck on Closed-Circuit rebreather	Equal variances assumed	5.593	.021	1.324	66	.190
	Equal variances not assumed			1.089	23.810	.287

APPENDIX H: Means and Standard Deviations of Employment Status

	Employment Status											
	Self-employed (n=9)		**Employed in the private sector (n=19)**		**Employed in the public sector (n=14)**		**Employed in the non-profit sector (n=3)**		**Retired (n=7)**		**Student (n=16)**	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Anchor to Structure	4.00	2.29	4.00	2.54	4.21	1.63	1.33	0.58	3.86	2.19	2.56	1.36
Anchor in Sediment Only	5.00	1.66	4.84	2.12	4.64	1.86	5.33	0.58	4.57	2.23	4.88	1.63
Anchor to Mooring Buoy	5.00	2.12	4.63	2.31	4.00	2.35	5.00	0.00	3.71	2.81	5.56	1.26
Only Live-Boating, No Anchor	3.67	2.12	3.58	2.27	4.71	1.77	4.67	1.53	3.29	2.63	5.00	1.55
Accidentally Damage Structure	2.22	1.92	2.79	1.65	2.50	1.91	1.67	0.58	2.71	1.80	1.94	0.77
Accidentally Expose Structure	2.56	2.01	3.05	1.78	3.29	1.90	2.00	1.00	3.14	1.95	2.25	1.13
Deliberately Damage Structure	1.00	0.00	1.89	1.91	2.07	2.23	1.00	0.00	2.00	1.41	1.06	0.25
Deliberately Expose Structure	2.56	2.01	3.11	2.69	2.86	2.44	1.00	0.00	3.14	2.27	1.63	0.81
Deliberately Remove Structure	3.00	2.45	2.89	2.51	2.79	2.46	1.67	1.15	2.29	1.98	1.25	0.58
Accidentally Damage Feature	2.00	1.66	3.00	1.89	2.71	1.82	1.67	0.58	2.71	1.80	2.13	0.81
Accidentally Expose Feature	2.44	1.67	3.21	1.99	3.07	1.69	2.00	1.00	2.86	1.77	2.38	1.09
Deliberately Damage Feature	1.22	0.44	1.63	1.38	2.07	2.23	1.00	0.00	2.14	1.46	1.06	0.25
Deliberately Expose Feature	2.56	2.13	2.79	2.46	2.93	2.40	1.00	0.00	3.14	2.27	1.56	0.73

	Self-employed (n=9)		Employed in the private sector (n=19)		Employed in the public sector (n=14)		Employed in the non-profit sector (n=3)		Retired (n=7)		Student (n=16)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Handle Artifacts Outside of Wreck	4.00	1.87	3.42	2.24	3.79	2.61	2.67	2.89	3.43	2.30	2.88	1.71
Move Artifacts Inside of Wreck	2.89	2.09	2.32	1.77	2.79	2.46	1.67	1.15	2.86	2.41	1.75	1.18
Move Artifacts Adjacent to Wreck	3.33	2.29	2.58	2.06	2.79	2.46	2.33	2.31	3.00	2.31	1.75	1.18
Move Artifacts Away From Wreck	3.33	2.06	2.37	2.03	2.79	2.46	2.33	2.31	3.00	2.31	1.88	1.36
Remove Artifacts from Inside of Wreck	3.33	2.60	3.05	2.48	2.71	2.49	2.00	1.73	2.86	2.41	1.44	1.09
Remove Artifacts Adjacent to Wreck	3.56	2.46	2.84	2.32	2.86	2.44	2.00	1.73	3.00	2.31	1.50	1.15
Remove Artifacts Away From Wreck	3.56	2.46	3.05	2.57	3.00	2.51	2.00	1.73	3.00	2.31	1.69	1.40
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.33	2.29	3.42	2.17	3.50	1.95	2.00	1.00	3.29	1.80	3.00	1.15
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.67	2.29	3.47	2.25	3.50	1.95	2.00	1.00	3.43	1.62	3.31	1.14
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.67	2.29	3.53	2.22	3.43	1.87	2.00	1.00	3.57	1.51	3.56	1.26
Excavate, handle, and return Artifacts from Inside of Wreck to same location	3.33	2.24	3.05	2.25	3.14	2.25	2.00	1.73	2.86	2.12	2.56	1.26
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	3.67	2.18	3.00	2.33	3.14	2.25	2.00	1.73	3.00	2.00	2.81	1.38
Excavate, handle, and return Artifacts Away From Wreck to same location	3.78	2.11	3.11	2.40	3.14	2.25	2.00	1.73	3.00	2.00	2.81	1.47

	Self-employed (n=9)		Employed in the private sector (n=19)		Employed in the public sector (n=14)		Employed in the non-profit sector (n=3)		Retired (n=7)		Student (n=16)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	2.78	2.22	2.68	2.43	2.86	2.25	1.67	1.15	2.71	1.98	1.88	1.15
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	2.89	2.15	2.58	2.22	2.86	2.25	1.67	1.15	2.71	1.98	1.94	1.39
Excavate, handle, and return Artifacts Away From Wreck to New Location	3.00	2.12	2.74	2.42	2.93	2.20	1.67	1.15	2.71	1.98	2.06	1.53
Collect Buried Artifacts Inside of Wreck	3.44	2.51	3.11	2.54	2.71	2.33	2.00	1.73	2.86	2.41	1.75	1.06
Collect Buried Artifacts Adjacent to Wreck	3.44	2.51	3.00	2.49	2.71	2.33	2.00	1.73	3.00	2.31	1.88	1.31
Collect Buried Artifacts Away From Wreck	3.89	2.37	3.05	2.57	2.79	2.29	2.00	1.73	3.00	2.31	2.00	1.46
Okay to Penetrate Wreck	6.22	0.67	5.68	1.38	5.79	1.19	5.33	1.15	5.43	1.51	5.44	0.89
Okay to Penetrate Wreck on Open-Circuit Scuba	5.44	1.24	5.26	1.56	5.36	1.22	4.67	2.31	5.14	2.12	4.88	1.31
Okay to Penetrate Wreck on Closed-Circuit rebreather	6.22	1.09	6.11	0.88	5.79	1.12	5.00	1.73	5.57	1.62	5.56	1.46

APPENDIX I: Welch and Brown-Forsythe's Test of Equality of Means for Employment Status

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Anchor to Structure	Welch	6.78	5.00	18.57	0.00
	Brown-Forsythe	2.47	5.00	40.60	0.05
Only Anchor to Mooring Buoy	Welch				
	Brown-Forsythe				
Deliberately Damage Structure	Welch				
	Brown-Forsythe				
Deliberately Expose Structure	Welch				
	Brown-Forsythe				
Deliberately Remove Structure	Welch	2.88	5.00	13.55	0.06
	Brown-Forsythe	1.68	5.00	41.83	0.16
Deliberately Damage Feature	Welch				
	Brown-Forsythe				
Deliberately Expose Feature	Welch				
	Brown-Forsythe				
Deliberately Remove Feature	Welch				
	Brown-Forsythe				
Accidentally Disturb Artifacts Away From Wreck	Welch	1.04	5.00	15.94	0.43
	Brown-Forsythe	0.72	5.00	39.16	0.61
Move Artifacts Inside of Wreck	Welch	0.88	5.00	14.81	0.52
	Brown-Forsythe	0.77	5.00	36.50	0.58
Remove Artifacts from Inside of Wreck	Welch	2.03	5.00	14.06	0.14
	Brown-Forsythe	1.32	5.00	36.80	0.28
Remove Artifacts Adjacent to Wreck	Welch	1.99	5.00	14.16	0.14
	Brown-Forsythe	1.41	5.00	36.26	0.24

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Remove Artifacts Away From Wreck	Welch	1.48	5.00	14.51	0.26
	Brown-Forsythe	1.19	5.00	39.73	0.33
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Welch	0.83	5.00	15.34	0.55
	Brown-Forsythe	0.45	5.00	42.80	0.81
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Welch	0.94	5.00	15.36	0.48
	Brown-Forsythe	0.44	5.00	43.95	0.82
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Welch	1.09	5.00	15.60	0.40
	Brown-Forsythe	0.47	5.00	44.38	0.80
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Welch	0.36	5.00	14.51	0.87
	Brown-Forsythe	0.39	5.00	37.55	0.85
Collect Buried Artifacts Inside of Wreck	Welch	1.47	5.00	14.03	0.26
	Brown-Forsythe	1.03	5.00	36.29	0.41
Collect Buried Artifacts Adjacent to Wreck	Welch	1.03	5.00	14.38	0.44
	Brown-Forsythe	0.85	5.00	37.69	0.52
Collect Buried Artifacts Away From Wreck	Welch	1.11	5.00	14.57	0.40
	Brown-Forsythe	1.05	5.00	39.01	0.40

APPENDIX J: ANOVA Results for Employment Status

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Anchor to Structure	Between Groups	24.52	4.00	1.40	0.24
	Within Groups	248.96	57.00		
	Total	273.48	61.00		
Anchor in Sediment	Between Groups	6.11	4.00	0.46	0.77
	Within Groups	190.16	57.00		
	Total	196.27	61.00		
Only Anchor to Mooring Buoy	Between Groups	25.64	4.00	1.43	0.24
	Within Groups	255.54	57.00		
	Total	281.18	61.00		
Only Live-Boating, No Anchor	Between Groups	24.46	4.00	1.51	0.21
	Within Groups	231.22	57.00		
	Total	255.68	61.00		
Accidentally Damage Structure	Between Groups	8.24	4.00	0.77	0.55
	Within Groups	153.12	57.00		
	Total	161.35	61.00		
Accidentally Expose Structure	Between Groups	12.37	4.00	1.07	0.38
	Within Groups	165.31	57.00		
	Total	177.68	61.00		
Accidentally Damage Feature	Between Groups	12.79	4.00	1.20	0.32
	Within Groups	152.31	57.00		
	Total	165.1	61.00		
Accidentally Expose Feature	Between Groups	15.97	4.00	1.48	0.22
	Within Groups	153.7	57.00		
	Total	169.68	61.00		
Accidentally Disturb Artifact Adjacent to Wreck	Between Groups	25.73	4.00	1.89	0.13
	Within Groups	194.48	57.00		
	Total	220.21	61.00		
Accidentally Disturb Artifacts Away From Wreck	Between Groups	24.56	4.00	1.53	0.20
	Within Groups	228.21	57.00		
	Total	252.77	61.00		
Move Artifacts Inside of Wreck	Between Groups	11.72	4.00	0.74	0.57
	Within Groups	225.2	57.00		
	Total	236.92	61.00		
Move Artifacts Adjacent to Wreck	Between Groups	9.03	4.00	0.49	0.74
	Within Groups	262.21	57.00		
	Total	271.24	61.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Move Artifacts Away From Wreck	Between Groups	8.84	4.00	0.49	0.74
	Within Groups	256.25	57.00		
	Total	265.1	61.00		
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Between Groups	13.67	4.00	0.99	0.42
	Within Groups	197.17	57.00		
	Total	210.84	61.00		
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Between Groups	13.15	4.00	0.94	0.45
	Within Groups	199.56	57.00		
	Total	212.71	61.00		
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Between Groups	10.58	4.00	0.76	0.56
	Within Groups	198.86	57.00		
	Total	209.44	61.00		
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Between Groups	6.82	4.00	0.42	0.79
	Within Groups	231.39	57.00		
	Total	238.21	61.00		
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Between Groups	5.3	4.00	0.31	0.87
	Within Groups	240.7	57.00		
	Total	246	61.00		
Excavate, handle, and return Artifacts Away From Wreck to same location	Between Groups	6.09	4.00	0.35	0.84
	Within Groups	248.76	57.00		
	Total	254.85	61.00		
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Between Groups	10.48	4.00	0.62	0.65
	Within Groups	240.96	57.00		
	Total	251.44	61.00		
Excavate, handle, and return Artifacts Away From Wreck to New Location	Between Groups	13.3	4.00	0.74	0.57
	Within Groups	256.89	57.00		
	Total	270.19	61.00		
Okay to Penetrate Wreck	Between Groups	10.58	4.00	2.05	0.10
	Within Groups	73.62	57.00		
	Total	84.19	61.00		
Okay to Penetrate Wreck on Open-Circuit Scuba	Between Groups	13.4	4.00	1.55	0.20
	Within Groups	122.99	57.00		
	Total	136.39	61.00		
Okay to Penetrate Wreck on Closed-Circuit rebreather	Between Groups	5.22	4.00	0.84	0.51
	Within Groups	89.05	57.00		
	Total	94.27	61.00		

APPENDIX K: Means and Standard Deviations of Age Range

	Age									
	18-30 Years Old (n=22)		**31-40 Years Old (n=12)**		**41-50 Years Old (n=10)**		**51-60 Years Old (n=21)**		**61-70 Years Old (n=4)**	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Anchor to Structure	2.95	1.89	4.17	2.37	3.10	2.38	3.86	1.98	4.25	2.22
Anchor in Sediment	4.55	1.79	5.83	1.47	4.00	2.11	5.10	1.55	4.00	2.31
Only Anchor to Mooring Buoy	5.14	1.64	5.08	2.23	5.20	1.69	3.33	2.20	7.00	0.00
Only Live-Boating, No Anchor	4.55	1.92	4.67	2.31	3.60	1.90	3.90	1.89	3.75	3.20
Accidentally Damage Structure	2.27	1.20	1.67	0.78	1.60	0.70	3.38	1.88	2.75	2.87
Accidentally Expose Structure	2.59	1.56	2.58	1.16	2.10	1.20	3.57	1.94	3.00	2.83
Deliberately Damage Structure	1.27	0.77	1.50	1.73	1.00	0.00	2.33	2.18	1.00	0.00
Deliberately Expose Structure	1.82	1.30	2.42	1.93	2.00	2.00	3.48	2.68	3.25	2.63
Deliberately Remove Structure	1.50	1.10	2.58	2.23	1.80	1.87	3.29	2.63	3.00	2.31
Accidentally Damage Feature	2.32	1.21	2.08	1.44	1.80	0.79	3.48	1.89	2.25	2.50
Accidentally Expose Feature	2.68	1.52	2.58	1.62	1.90	0.88	3.57	1.75	2.75	2.36
Deliberately Damage Feature	1.27	0.77	1.17	0.58	1.10	0.32	2.33	2.13	1.25	0.50
Deliberately Expose Feature	1.77	1.27	2.33	1.92	1.50	1.27	3.52	2.56	3.25	2.63
Deliberately Remove Feature	1.32	1.04	2.58	2.23	1.50	1.27	3.38	2.48	3.00	2.45
Accidentally Disturb Artifacts Inside Wreck	2.59	1.40	2.83	2.12	2.30	1.57	3.67	1.96	2.75	2.87
Accidentally Disturb Artifact Adjacent to Wreck	2.82	1.56	2.92	2.02	2.60	1.58	3.86	1.93	2.75	2.87
Accidentally Disturb Artifacts Away From Wreck	3.05	1.79	3.00	2.00	2.90	1.97	4.05	2.09	3.00	2.71
Handle Artifacts Inside Wreck	2.55	1.63	3.50	2.50	2.70	1.83	4.05	2.31	3.75	2.75
Handle Artifacts Adjacent to Wreck	2.77	1.77	3.58	2.47	2.70	2.06	4.24	2.30	3.75	2.75
Handle Artifacts Outside of Wreck	2.86	1.81	3.58	2.47	2.60	1.65	4.10	2.34	4.00	2.45
Move Artifacts Inside of Wreck	1.86	1.36	1.92	1.08	2.20	1.62	3.14	2.48	2.75	2.87
Move Artifacts Adjacent to Wreck	1.86	1.36	2.08	1.38	2.70	2.50	3.33	2.42	3.00	2.71
Move Artifacts Away From Wreck	1.82	1.33	2.17	1.34	2.40	1.96	3.38	2.58	3.00	2.71
Remove Artifacts from Inside of Wreck	1.68	1.32	2.67	2.27	2.10	2.13	3.38	2.60	3.75	3.20
Remove Artifacts Adjacent to Wreck	1.77	1.48	2.67	2.27	2.10	1.91	3.33	2.42	4.00	2.94
Remove Artifacts Away From Wreck	1.95	1.73	2.67	2.27	2.30	2.11	3.48	2.54	4.00	2.94
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.09	1.72	3.25	1.86	2.80	1.69	3.67	1.96	3.75	2.75
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.36	1.79	3.25	1.86	2.80	1.69	3.81	1.94	4.00	2.45

	18-30 Years Old (n=22)		31-40 Years Old (n=12)		41-50 Years Old (n=10)		51-60 Years Old (n=21)		61-70 Years Old (n=4)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.55	1.84	3.25	1.86	2.90	1.66	3.76	1.89	4.25	2.22
Excavate, handle, and return Artifacts from Inside of Wreck to same location	2.45	1.41	3.08	2.11	2.10	1.66	3.62	2.18	3.50	3.00
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	2.68	1.59	3.08	2.11	2.00	1.63	3.71	2.17	3.75	2.75
Excavate, handle, and return Artifacts Away From Wreck to same location	2.82	1.71	2.92	2.19	2.10	1.66	3.76	2.14	3.75	2.75
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	2.09	1.57	2.33	1.83	1.80	1.55	3.19	2.44	3.00	2.71
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	2.18	1.68	2.25	1.86	1.90	1.60	3.10	2.26	3.00	2.71
Excavate, handle, and return Artifacts Away From Wreck to New Location	2.27	1.75	2.25	1.86	1.90	1.60	3.33	2.35	3.00	2.71
Collect Buried Artifacts Inside of Wreck	1.91	1.27	2.67	2.27	2.10	2.08	3.48	2.52	3.75	3.20
Collect Buried Artifacts Adjacent to Wreck	2.05	1.53	2.67	2.27	1.80	1.62	3.48	2.52	4.00	2.94
Collect Buried Artifacts Away From Wreck	2.18	1.74	2.67	2.27	1.80	1.62	3.71	2.43	4.00	2.94
Okay to Penetrate Wreck	5.45	1.06	5.58	0.67	5.40	1.58	6.00	1.22	6.25	0.96
Okay to Penetrate Wreck on Open-Circuit Scuba	4.77	1.63	5.25	1.06	5.00	1.33	5.57	1.54	5.75	0.96
Okay to Penetrate Wreck on Closed-Circuit rebreather	5.50	1.47	5.92	0.51	5.70	1.16	6.05	1.24	6.50	1.00

APPENDIX L: Welch and Brown-Forsythe's Test of Equality of Means for Age Range

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Only Anchor to Mooring Buoy	Welch				
	Brown-Forsythe				
Accidentally Damage Structure	Welch	4.03	4.00	16.40	0.02
	Brown-Forsythe	2.79	4.00	7.18	0.11
Deliberately Damage Structure	Welch				
	Brown-Forsythe				
Deliberately Expose Structure	Welch	1.67	4.00	15.49	0.21
	Brown-Forsythe	1.83	4.00	20.79	0.16
Deliberately Remove Structure	Welch	2.38	4.00	15.25	0.10
	Brown-Forsythe	2.23	4.00	26.04	0.09
Accidentally Damage Feature	Welch	2.75	4.00	16.21	0.06
	Brown-Forsythe	2.39	4.00	11.05	0.11
Deliberately Damage Feature	Welch	1.62	4.00	17.95	0.21
	Brown-Forsythe	4.51	4.00	32.44	0.01
Deliberately Expose Feature	Welch	2.43	4.00	15.83	0.09
	Brown-Forsythe	2.77	4.00	16.92	0.06
Deliberately Remove Feature	Welch	3.51	4.00	15.43	0.03
	Brown-Forsythe	3.41	4.00	19.59	0.03
Handle Artifacts Inside Wreck	Welch	1.56	4.00	15.80	0.23
	Brown-Forsythe	1.40	4.00	20.21	0.27
Move Artifacts Inside of Wreck	Welch	1.10	4.00	15.91	0.39
	Brown-Forsythe	1.30	4.00	12.51	0.32
Move Artifacts Adjacent to Wreck	Welch	1.51	4.00	15.60	0.25
	Brown-Forsythe	1.41	4.00	18.11	0.27

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Move Artifacts Away From Wreck	Welch	1.48	4.00	15.73	0.26
	Brown-Forsythe	1.66	4.00	16.59	0.21
Remove Artifacts from Inside of Wreck	Welch	2.01	4.00	15.26	0.14
	Brown-Forsythe	1.65	4.00	15.77	0.21
Remove Artifacts Adjacent to Wreck	Welch	1.86	4.00	15.59	0.17
	Brown-Forsythe	1.74	4.00	17.19	0.19
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Welch	1.41	4.00	15.61	0.28
	Brown-Forsythe	1.22	4.00	13.89	0.35
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Welch	1.00	4.00	16.03	0.44
	Brown-Forsythe	1.13	4.00	17.04	0.37
Collect Buried Artifacts Inside of Wreck	Welch	1.74	4.00	15.20	0.19
	Brown-Forsythe	1.48	4.00	15.16	0.26
Collect Buried Artifacts Adjacent to Wreck	Welch	1.71	4.00	15.80	0.20
	Brown-Forsythe	1.78	4.00	16.75	0.18
Collect Buried Artifacts Away From Wreck	Welch	1.99	4.00	16.00	0.15
	Brown-Forsythe	2.01	4.00	17.03	0.14

APPENDIX M: ANOVA Results for Age Range

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Anchor to Structure	Between Groups	24.52	4.00	1.40	0.24
	Within Groups	248.96	57.00		
	Total	273.48	61.00		
Anchor in Sediment	Between Groups	6.11	4.00	0.46	0.77
	Within Groups	190.16	57.00		
	Total	196.27	61.00		
Only Anchor to Mooring Buoy	Between Groups	25.64	4.00	1.43	0.24
	Within Groups	255.54	57.00		
	Total	281.18	61.00		
Only Live-Boating, No Anchor	Between Groups	24.46	4.00	1.51	0.21
	Within Groups	231.22	57.00		
	Total	255.68	61.00		
Accidentally Damage Structure	Between Groups	8.24	4.00	0.77	0.55
	Within Groups	153.12	57.00		
	Total	161.35	61.00		
Accidentally Expose Structure	Between Groups	12.37	4.00	1.07	0.38
	Within Groups	165.31	57.00		
	Total	177.68	61.00		
Accidentally Damage Feature	Between Groups	12.79	4.00	1.20	0.32
	Within Groups	152.31	57.00		
	Total	165.10	61.00		
Accidentally Expose Feature	Between Groups	15.97	4.00	1.48	0.22
	Within Groups	153.70	57.00		
	Total	169.68	61.00		
Accidentally Disturb Artifact Adjacent to Wreck	Between Groups	25.73	4.00	1.89	0.13
	Within Groups	194.48	57.00		
	Total	220.21	61.00		
Accidentally Disturb Artifacts Away From Wreck	Between Groups	24.56	4.00	1.53	0.20
	Within Groups	228.21	57.00		
	Total	252.77	61.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Move Artifacts Inside of Wreck	Between Groups	11.72	4.00	0.74	0.57
	Within Groups	225.20	57.00		
	Total	236.92	61.00		
Move Artifacts Adjacent to Wreck	Between Groups	9.03	4.00	0.49	0.74
	Within Groups	262.21	57.00		
	Total	271.24	61.00		
Move Artifacts Away From Wreck	Between Groups	8.84	4.00	0.49	0.74
	Within Groups	256.25	57.00		
	Total	265.10	61.00		
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Between Groups	13.67	4.00	0.99	0.42
	Within Groups	197.17	57.00		
	Total	210.84	61.00		
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Between Groups	13.15	4.00	0.94	0.45
	Within Groups	199.56	57.00		
	Total	212.71	61.00		
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Between Groups	10.58	4.00	0.76	0.56
	Within Groups	198.86	57.00		
	Total	209.44	61.00		
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Between Groups	6.82	4.00	0.42	0.79
	Within Groups	231.39	57.00		
	Total	238.21	61.00		
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Between Groups	5.30	4.00	0.31	0.87
	Within Groups	240.70	57.00		
	Total	246.00	61.00		
Excavate, handle, and return Artifacts Away From Wreck to same location	Between Groups	6.09	4.00	0.35	0.84
	Within Groups	248.76	57.00		
	Total	254.85	61.00		
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Between Groups	10.48	4.00	0.62	0.65
	Within Groups	240.96	57.00		
	Total	251.44	61.00		
Excavate, handle, and return Artifacts Away From Wreck to New Location	Between Groups	13.30	4.00	0.74	0.57
	Within Groups	256.89	57.00		
	Total	270.19	61.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Okay to Penetrate Wreck	Between Groups	10.58	4.00	2.05	0.10
	Within Groups	73.62	57.00		
	Total	84.19	61.00		
Okay to Penetrate Wreck on Open-Circuit Scuba	Between Groups	13.40	4.00	1.55	0.20
	Within Groups	122.99	57.00		
	Total	136.39	61.00		
Okay to Penetrate Wreck on Closed-Circuit rebreather	Between Groups	5.22	4.00	0.84	0.51
	Within Groups	89.05	57.00		
	Total	94.27	61.00		

APPENDIX N: Means and Standard Deviations of Education Level

	Education Level					
	Some college/ Associate's degree (n=13)		Bachelor's degree (n=34)		Graduate degree (n=21)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**
Anchor to Structure	4.00	1.68	3.82	2.08	2.86	2.29
Anchor in Sediment	4.77	1.69	5.00	1.87	4.71	1.74
Only Anchor to Mooring Buoy	3.31	2.18	4.47	1.89	5.81	1.86
Only Live-Boating, No Anchor	3.77	2.39	3.97	1.88	4.95	1.88
Accidentally Damage Structure	3.00	1.78	2.32	1.53	2.33	1.56
Accidentally Expose Structure	3.54	1.81	2.82	1.66	2.52	1.66
Deliberately Damage Structure	1.92	1.89	1.53	1.52	1.48	1.36
Deliberately Expose Structure	3.62	2.63	2.38	1.89	2.19	2.11
Deliberately Remove Structure	3.08	2.40	2.26	2.09	2.14	2.03
Accidentally Damage Feature	3.31	1.70	2.53	1.62	2.19	1.47
Accidentally Expose Feature	3.46	1.61	2.85	1.67	2.48	1.57
Deliberately Damage Feature	2.31	2.18	1.47	1.24	1.24	0.70
Deliberately Expose Feature	3.23	2.45	2.38	1.91	2.14	2.03
Deliberately Remove Feature	2.92	2.33	2.24	2.02	2.05	2.01
Accidentally Disturb Artifacts Inside Wreck	3.69	1.89	2.85	1.81	2.67	1.85
Accidentally Disturb Artifact Adjacent to Wreck	3.69	1.89	3.12	1.81	2.86	1.93
Accidentally Disturb Artifacts Away From Wreck	3.85	1.91	3.35	2.04	3.00	2.02
Handle Artifacts Inside Wreck	4.31	2.14	3.29	2.18	2.62	1.96
Handle Artifacts Adjacent to Wreck	4.15	2.27	3.56	2.25	2.76	2.02
Handle Artifacts Outside of Wreck	4.23	2.20	3.56	2.18	2.67	1.93
Move Artifacts Inside of Wreck	3.23	2.28	2.41	1.91	1.81	1.47
Move Artifacts Adjacent to Wreck	3.46	2.50	2.56	2.06	2.00	1.52
Move Artifacts Away From Wreck	3.46	2.37	2.50	1.94	2.00	1.79
Remove Artifacts from Inside of Wreck	3.15	2.41	2.62	2.22	2.14	2.20
Remove Artifacts Adjacent to Wreck	3.15	2.27	2.65	2.25	2.19	1.94
Remove Artifacts Away From Wreck	3.46	2.37	2.71	2.29	2.33	2.18
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.85	1.77	3.41	1.84	2.81	1.89
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.85	1.77	3.68	1.85	2.86	1.85

	Some college/ Associate's degree (n=13)		Bachelor's degree (n=34)		Graduate degree (n=21)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.92	1.71	3.65	1.89	3.10	1.84
Excavate, handle, and return Artifacts from Inside of Wreck to same location	3.23	2.01	3.18	1.95	2.43	1.94
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	3.31	2.10	3.32	1.98	2.48	1.89
Excavate, handle, and return Artifacts Away From Wreck to same location	3.38	2.06	3.32	2.07	2.57	1.89
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	2.92	2.18	2.65	2.06	2.00	1.79
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	3.15	2.23	2.65	2.06	1.86	1.46
Excavate, handle, and return Artifacts Away From Wreck to New Location	3.31	2.25	2.68	2.04	2.05	1.80
Collect Buried Artifacts Inside of Wreck	3.31	2.43	2.71	2.08	2.24	2.19
Collect Buried Artifacts Adjacent to Wreck	3.23	2.35	2.74	2.12	2.29	2.17
Collect Buried Artifacts Away From Wreck	3.38	2.36	2.79	2.16	2.48	2.23
Okay to Penetrate Wreck	3.69	2.78	2.12	2.01	2.19	2.11
Okay to Penetrate Wreck on Open-Circuit Scuba	5.54	1.56	5.85	0.93	5.48	1.21
Okay to Penetrate Wreck on Closed-Circuit rebreather	5.08	1.38	5.56	1.21	4.62	1.72

APPENDIX O: Welch and Brown-Forsythe's Test of Equality of Means for Education Level

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Deliberately Damage Feature	Welch	1.65	2.00	27.44	0.21
	Brown-Forsythe	1.97	2.00	19.55	0.17
Move Artifacts Adjacent to Wreck	Welch	1.95	2.00	29.51	0.16
	Brown-Forsythe	1.95	2.00	32.09	0.16
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Welch	2.34	2.00	30.26	0.11
	Brown-Forsythe	1.97	2.00	36.37	0.15
Okay to Penetrate Wreck on Closed-Circuit rebreather	Welch	1.47	2.00	27.84	0.25
	Brown-Forsythe	1.64	2.00	41.61	0.21

APPENDIX P: ANOVA Results for Education Level

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Anchor to Structure	Between Groups	15.25	2.00	1.76	0.18
	Within Groups	281.51	65.00		
	Total	296.77	67.00		
Anchor in Sediment	Between Groups	1.22	2.00	0.19	0.83
	Within Groups	210.59	65.00		
	Total	211.81	67.00		
Only Anchor to Mooring Buoy	Between Groups	52.74	2.00	7.01	0.00
	Within Groups	244.48	65.00		
	Total	297.22	67.00		
Only Live-Boating, No Anchor	Between Groups	16.01	2.00	2.03	0.14
	Within Groups	256.23	65.00		
	Total	272.24	67.00		
Accidentally Damage Structure	Between Groups	4.76	2.00	0.94	0.40
	Within Groups	164.11	65.00		
	Total	168.87	67.00		
Accidentally Expose Structure	Between Groups	8.40	2.00	1.47	0.24
	Within Groups	185.41	65.00		
	Total	193.81	67.00		
Deliberately Damage Structure	Between Groups	1.84	2.00	0.38	0.68
	Within Groups	156.63	65.00		
	Total	158.47	67.00		
Deliberately Expose Structure	Between Groups	18.42	2.00	2.06	0.14
	Within Groups	290.34	65.00		
	Total	308.77	67.00		
Deliberately Remove Structure	Between Groups	7.95	2.00	0.87	0.42
	Within Groups	296.11	65.00		
	Total	304.06	67.00		
Accidentally Damage Feature	Between Groups	10.15	2.00	2.01	0.14
	Within Groups	164.48	65.00		
	Total	174.63	67.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Accidentally Expose Feature	Between Groups	7.80	2.00	1.47	0.24
	Within Groups	172.73	65.00		
	Total	180.53	67.00		
Deliberately Expose Feature	Between Groups	10.03	2.00	1.19	0.31
	Within Groups	274.91	65.00		
	Total	284.94	67.00		
Deliberately Remove Feature	Between Groups	6.52	2.00	0.76	0.47
	Within Groups	279.99	65.00		
	Total	286.52	67.00		
Accidentally Disturb Artifacts Inside Wreck	Between Groups	9.17	2.00	1.36	0.27
	Within Groups	219.70	65.00		
	Total	228.87	67.00		
Accidentally Disturb Artifact Adjacent to Wreck	Between Groups	5.66	2.00	0.82	0.45
	Within Groups	224.87	65.00		
	Total	230.53	67.00		
Accidentally Disturb Artifacts Away From Wreck	Between Groups	5.76	2.00	0.71	0.50
	Within Groups	263.46	65.00		
	Total	269.22	67.00		
Handle Artifacts Inside Wreck	Between Groups	22.91	2.00	2.58	0.08
	Within Groups	288.78	65.00		
	Total	311.69	67.00		
Handle Artifacts Adjacent to Wreck	Between Groups	16.75	2.00	1.76	0.18
	Within Groups	309.88	65.00		
	Total	326.63	67.00		
Handle Artifacts Outside of Wreck	Between Groups	21.11	2.00	2.37	0.10
	Within Groups	289.36	65.00		
	Total	310.47	67.00		
Move Artifacts Inside of Wreck	Between Groups	16.28	2.00	2.34	0.10
	Within Groups	225.78	65.00		
	Total	242.06	67.00		
Move Artifacts Away From Wreck	Between Groups	17.21	2.00	2.19	0.12
	Within Groups	255.73	65.00		
	Total	272.94	67.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Remove Artifacts from Inside of Wreck	Between Groups	8.34	2.00	0.83	0.44
	Within Groups	328.29	65.00		
	Total	336.63	67.00		
Remove Artifacts Adjacent to Wreck	Between Groups	7.58	2.00	0.81	0.45
	Within Groups	304.70	65.00		
	Total	312.28	67.00		
Remove Artifacts Away From Wreck	Between Groups	10.28	2.00	1.00	0.37
	Within Groups	334.96	65.00		
	Total	345.24	67.00		
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Between Groups	9.35	2.00	1.37	0.26
	Within Groups	221.17	65.00		
	Total	230.52	67.00		
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Between Groups	11.16	2.00	1.65	0.20
	Within Groups	219.71	65.00		
	Total	230.87	67.00		
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Between Groups	6.44	2.00	0.95	0.39
	Within Groups	220.50	65.00		
	Total	226.94	67.00		
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Between Groups	8.48	2.00	1.11	0.34
	Within Groups	248.39	65.00		
	Total	256.87	67.00		
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Between Groups	10.32	2.00	1.32	0.27
	Within Groups	253.45	65.00		
	Total	263.77	67.00		
Excavate, handle, and return Artifacts Away From Wreck to same location	Between Groups	8.62	2.00	1.06	0.35
	Within Groups	263.66	65.00		
	Total	272.28	67.00		
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Between Groups	8.31	2.00	1.04	0.36
	Within Groups	260.69	65.00		
	Total	269.00	67.00		
Excavate, handle, and return Artifacts Away From Wreck to New Location	Between Groups	13.12	2.00	1.62	0.21
	Within Groups	263.16	65.00		
	Total	276.28	67.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Collect Buried Artifacts Inside of Wreck	Between Groups	9.25	2.00	0.97	0.38
	Within Groups	309.64	65.00		
	Total	318.88	67.00		
Collect Buried Artifacts Adjacent to Wreck	Between Groups	7.30	2.00	0.77	0.47
	Within Groups	309.21	65.00		
	Total	316.52	67.00		
Collect Buried Artifacts Away From Wreck	Between Groups	6.64	2.00	0.68	0.51
	Within Groups	319.87	65.00		
	Total	326.52	67.00		
Okay to Penetrate Wreck	Between Groups	2.15	2.00	0.81	0.45
	Within Groups	86.73	65.00		
	Total	88.88	67.00		
Okay to Penetrate Wreck on Open-Circuit Scuba	Between Groups	11.63	2.00	2.90	0.06
	Within Groups	130.26	65.00		
	Total	141.88	67.00		

APPENDIX Q: Means and Standard Deviations of Sustainable Actions by Being a Regular at a Dive Shop

	Do you consider yourself a regular at a dive shop?			
	No (n=20)		Yes (n=52)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Anchor to Structure	1.20	0.41	1.37	0.49
Anchor in Sediment	3.55	2.31	3.62	2.01
Only Anchor to Mooring Buoy	4.60	2.14	4.90	1.71
Only Live-Boating, No Anchor	4.15	2.32	4.69	2.04
Accidentally Damage Structure	4.35	2.11	4.04	1.98
Accidentally Expose Structure	2.75	1.45	2.42	1.64
Deliberately Damage Structure	3.00	1.59	2.88	1.76
Deliberately Expose Structure	3.00	2.22	2.42	2.08
Deliberately Remove Structure	2.85	2.30	2.25	2.03
Accidentally Damage Feature	2.60	1.47	2.62	1.65
Accidentally Expose Feature	2.80	1.54	2.90	1.65
Deliberately Damage Feature	1.65	1.23	1.62	1.47
Deliberately Expose Feature	2.95	2.16	2.33	1.97
Deliberately Remove Feature	2.70	2.30	2.19	1.93
Accidentally Disturb Artifacts Inside Wreck	3.20	1.79	2.87	1.84
Accidentally Disturb Artifact Adjacent to Wreck	3.45	1.82	3.02	1.83
Accidentally Disturb Artifacts Away From Wreck	3.50	1.79	3.27	2.03
Handle Artifacts Inside Wreck	3.30	1.95	3.25	2.19
Handle Artifacts Adjacent to Wreck	3.55	1.99	3.35	2.24
Handle Artifacts Outside of Wreck	3.55	1.99	3.33	2.17
Move Artifacts Inside of Wreck	2.75	1.86	2.27	1.88
Move Artifacts Adjacent to Wreck	2.75	1.86	2.50	2.07
Move Artifacts Away From Wreck	2.85	2.08	2.42	1.95
Remove Artifacts from Inside of Wreck	2.85	2.35	2.48	2.16
Remove Artifacts Adjacent to Wreck	2.75	2.15	2.56	2.13
Remove Artifacts Away From Wreck	2.95	2.31	2.65	2.21
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.40	1.79	3.31	1.81
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.50	1.73	3.46	1.83
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.60	1.70	3.52	1.82
Excavate, handle, and return Artifacts from Inside of Wreck to same location	3.05	1.93	2.92	1.93
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	3.10	1.92	3.04	1.97
Excavate, handle, and return Artifacts Away From Wreck to same location	3.15	1.93	3.08	2.01

	No (n=20)		Yes (n=52)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	2.85	2.08	2.38	1.93
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	2.65	1.90	2.46	1.95
Excavate, handle, and return Artifacts Away From Wreck to New Location	2.85	2.08	2.52	1.98
Collect Buried Artifacts Inside of Wreck	2.90	2.27	2.60	2.11
Collect Buried Artifacts Adjacent to Wreck	2.90	2.27	2.62	2.10
Collect Buried Artifacts Away From Wreck	2.95	2.24	2.75	2.16
Okay to Penetrate Wreck	5.35	1.27	5.79	1.07
Okay to Penetrate Wreck on Open-Circuit Scuba	4.85	1.73	5.35	1.15
Okay to Penetrate Wreck on Closed-Circuit rebreather	5.30	1.69	5.98	0.94

APPENDIX R: T-test Statistics for Being a Regular at a Dive Shop

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Anchor to Structure	Equal variances assumed	.85	.36	-.12	70.00	.91
	Equal variances not assumed			-.11	30.77	.91
Anchor in Sediment	Equal variances assumed	1.61	.21	-.63	70.00	.53
	Equal variances not assumed			-.57	28.81	.57
Only Anchor to Mooring Buoy	Equal variances assumed	.98	.33	-.97	70.00	.34
	Equal variances not assumed			-.92	30.97	.37
Only Live-Boating, No Anchor	Equal variances assumed	.29	.59	.59	70.00	.56
	Equal variances not assumed			.57	32.66	.57
Accidentally Damage Structure	Equal variances assumed	.51	.48	.78	70.00	.44
	Equal variances not assumed			.83	38.83	.41
Accidentally Expose Structure	Equal variances assumed	.74	.39	.26	70.00	.80
	Equal variances not assumed			.27	37.92	.79
Deliberately Damage Structure	Equal variances assumed	.32	.58	-.21	70.00	.83
	Equal variances not assumed			-.24	45.52	.81
Deliberately Expose Structure	Equal variances assumed	.41	.52	1.03	70.00	.30
	Equal variances not assumed			1.00	32.56	.32
Deliberately Remove Structure	Equal variances assumed	1.67	.20	1.08	70.00	.28
	Equal variances not assumed			1.02	31.02	.31
Accidentally Damage Feature	Equal variances assumed	.57	.45	-.04	70.00	.97
	Equal variances not assumed			-.04	38.55	.97

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Accidentally Expose Feature	Equal variances assumed	.06	.81	-.24	70.00	.81
	Equal variances not assumed			-.25	36.71	.80
Deliberately Damage Feature	Equal variances assumed	.00	.99	.09	70.00	.93
	Equal variances not assumed			.10	41.16	.92
Deliberately Expose Feature	Equal variances assumed	.71	.40	1.17	70.00	.25
	Equal variances not assumed			1.12	31.81	.27
Deliberately Remove Feature	Equal variances assumed	2.38	.13	.95	70.00	.35
	Equal variances not assumed			.88	29.91	.39
Accidentally Disturb Artifacts Inside Wreck	Equal variances assumed	.00	.96	.70	70.00	.49
	Equal variances not assumed			.70	35.26	.49
Accidentally Disturb Artifact Adjacent to Wreck	Equal variances assumed	.17	.68	.90	70.00	.37
	Equal variances not assumed			.90	34.71	.38
Accidentally Disturb Artifacts Away From Wreck	Equal variances assumed	.30	.58	.45	70.00	.66
	Equal variances not assumed			.47	38.87	.64
Handle Artifacts Inside Wreck	Equal variances assumed	.93	.34	.09	70.00	.93
	Equal variances not assumed			.09	38.47	.93
Handle Artifacts Adjacent to Wreck	Equal variances assumed	1.30	.26	.36	70.00	.72
	Equal variances not assumed			.38	38.68	.71
Handle Artifacts Outside of Wreck	Equal variances assumed	.63	.43	.40	70.00	.69
	Equal variances not assumed			.42	37.45	.68

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Move Artifacts Inside of Wreck	Equal variances assumed	.05	.83	.97	70.00	.33
	Equal variances not assumed			.98	34.85	.33
Move Artifacts Adjacent to Wreck	Equal variances assumed	.23	.63	.47	70.00	.64
	Equal variances not assumed			.49	38.22	.62
Move Artifacts Away From Wreck	Equal variances assumed	.24	.62	.82	70.00	.42
	Equal variances not assumed			.79	32.62	.43
Remove Artifacts from Inside of Wreck	Equal variances assumed	1.24	.27	.64	70.00	.53
	Equal variances not assumed			.61	32.09	.55
Remove Artifacts Adjacent to Wreck	Equal variances assumed	.38	.54	.34	70.00	.73
	Equal variances not assumed			.34	34.21	.74
Remove Artifacts Away From Wreck	Equal variances assumed	.37	.55	.50	70.00	.62
	Equal variances not assumed			.49	33.30	.62
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Equal variances assumed	.02	.88	.19	70.00	.85
	Equal variances not assumed			.20	34.89	.85
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Equal variances assumed	.24	.62	.08	70.00	.94
	Equal variances not assumed			.08	36.34	.93
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Equal variances assumed	.34	.56	.17	70.00	.86
	Equal variances not assumed			.18	36.82	.86

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Equal variances assumed	.08	.78	.25	70.00	.80
	Equal variances not assumed			.25	34.46	.80
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Equal variances assumed	.04	.83	.12	70.00	.91
	Equal variances not assumed			.12	35.40	.90
Excavate, handle, and return Artifacts Away From Wreck to same location	Equal variances assumed	.01	.92	.14	70.00	.89
	Equal variances not assumed			.14	35.86	.89
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Equal variances assumed	.71	.40	.90	70.00	.37
	Equal variances not assumed			.87	32.31	.39
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Equal variances assumed	.09	.76	.37	70.00	.71
	Equal variances not assumed			.37	35.44	.71
Excavate, handle, and return Artifacts Away From Wreck to New Location	Equal variances assumed	.38	.54	.63	70.00	.53
	Equal variances not assumed			.61	32.93	.54

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Collect Buried Artifacts Inside of Wreck	Equal variances assumed	.50	.48	.54	70.00	.59
	Equal variances not assumed			.52	32.38	.61
Collect Buried Artifacts Adjacent to Wreck	Equal variances assumed	.57	.45	.50	70.00	.62
	Equal variances not assumed			.49	32.24	.63
Collect Buried Artifacts Away From Wreck	Equal variances assumed	.12	.73	.35	70.00	.73
	Equal variances not assumed			.34	33.47	.73
Okay to Penetrate Wreck	Equal variances assumed	2.37	.13	-1.48	70.00	.14
	Equal variances not assumed			-1.37	30.05	.18
Okay to Penetrate Wreck on Open-Circuit Scuba	Equal variances assumed	4.60	.04	-1.41	70.00	.16
	Equal variances not assumed			-1.19	25.80	.25
Okay to Penetrate Wreck on Closed-Circuit rebreather	Equal variances assumed	13.28	.00	-2.17	70.00	.03
	Equal variances not assumed			-1.70	23.66	.10

APPENDIX S: Means and Standard Deviations of Sustainable Actions by Archaeological Group Membership

	Do you work with a maritime history or archaeological group?			
	No (n=49)		Yes (n=23)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Anchor to Structure	4.00	2.11	2.74	1.76
Anchor in Sediment	4.59	1.96	5.30	1.43
Only Anchor to Mooring Buoy	4.31	2.25	5.04	1.77
Only Live-Boating, No Anchor	3.51	1.96	5.43	1.41
Accidentally Damage Structure	2.80	1.71	1.91	1.08
Accidentally Expose Structure	3.18	1.84	2.35	1.19
Deliberately Damage Structure	1.73	1.66	1.35	1.19
Deliberately Expose Structure	2.78	2.22	2.17	1.87
Deliberately Remove Structure	2.86	2.33	1.48	1.08
Accidentally Damage Feature	2.84	1.75	2.13	1.06
Accidentally Expose Feature	3.10	1.77	2.39	1.08
Deliberately Damage Feature	1.86	1.59	1.13	0.63
Deliberately Expose Feature	2.82	2.20	1.83	1.44
Deliberately Remove Feature	2.78	2.26	1.39	0.94
Accidentally Disturb Artifacts Inside Wreck	3.39	1.96	2.04	1.02
Accidentally Disturb Artifact Adjacent to Wreck	3.59	1.94	2.17	1.07
Accidentally Disturb Artifacts Away From Wreck	3.82	2.07	2.30	1.18
Handle Artifacts Inside Wreck	3.73	2.10	2.26	1.79
Handle Artifacts Adjacent to Wreck	3.92	2.14	2.30	1.79
Handle Artifacts Outside of Wreck	3.94	2.08	2.22	1.68
Move Artifacts Inside of Wreck	2.90	2.01	1.35	0.88
Move Artifacts Adjacent to Wreck	3.04	2.06	1.57	1.47
Move Artifacts Away From Wreck	3.08	2.10	1.39	1.03
Remove Artifacts from Inside of Wreck	3.12	2.39	1.43	1.08
Remove Artifacts Adjacent to Wreck	3.20	2.28	1.35	0.83
Remove Artifacts Away From Wreck	3.39	2.38	1.35	0.83
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.69	1.91	2.57	1.24
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.82	1.90	2.74	1.29
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.88	1.87	2.83	1.34
Excavate, handle, and return Artifacts from Inside of Wreck to same location	3.29	2.05	2.26	1.39
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	3.45	2.05	2.22	1.38
Excavate, handle, and return Artifacts Away From Wreck to same location	3.51	2.07	2.22	1.41

	No (n=49)		Yes (n=23)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	3.04	2.14	1.39	0.78
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	3.02	2.09	1.43	0.84
Excavate, handle, and return Artifacts Away From Wreck to New Location	3.16	2.14	1.43	0.84
Collect Buried Artifacts Inside of Wreck	3.20	2.27	1.57	1.27
Collect Buried Artifacts Adjacent to Wreck	3.29	2.29	1.43	0.90
Collect Buried Artifacts Away From Wreck	3.45	2.29	1.43	0.90
Okay to Penetrate Wreck	5.69	1.16	5.61	1.12
Okay to Penetrate Wreck on Open-Circuit Scuba	5.27	1.32	5.09	1.41
Okay to Penetrate Wreck on Closed-Circuit rebreather	5.69	1.37	6.00	0.80

APPENDIX T: T-test Statistics for Archaeological Group Membership

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Anchor to Structure	Equal variances assumed	3.60	0.06	2.48	70.00	0.02
	Equal variances not assumed			2.65	50.98	0.01
Anchor in Sediment	Equal variances assumed	5.07	0.03	-1.56	70.00	0.12
	Equal variances not assumed			-1.74	57.43	0.09
Only Anchor to Mooring Buoy	Equal variances assumed	4.36	0.04	-1.38	70.00	0.17
	Equal variances not assumed			-1.51	53.77	0.14
Only Live-Boating, No Anchor	Equal variances assumed	6.45	0.01	-4.22	70.00	0.00
	Equal variances not assumed			-4.74	58.13	0.00
Accidentally Damage Structure	Equal variances assumed	5.74	0.02	2.27	70.00	0.03
	Equal variances not assumed			2.66	63.59	0.01
Accidentally Expose Structure	Equal variances assumed	5.97	0.02	1.98	70.00	0.05
	Equal variances not assumed			2.31	62.89	0.02
Deliberately Damage Structure	Equal variances assumed	3.10	0.08	1.00	70.00	0.32
	Equal variances not assumed			1.13	58.09	0.26
Deliberately Expose Structure	Equal variances assumed	2.38	0.13	1.12	70.00	0.26
	Equal variances not assumed			1.20	50.47	0.24
Deliberately Remove Structure	Equal variances assumed	30.42	0.00	2.70	70.00	0.01
	Equal variances not assumed			3.43	70.00	0.00
Accidentally Damage Feature	Equal variances assumed	7.15	0.01	1.79	70.00	0.08
	Equal variances not assumed			2.12	65.35	0.04

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Accidentally Expose Feature	Equal variances assumed	5.93	0.02	1.77	70.00	0.08
	Equal variances not assumed			2.10	65.19	0.04
Deliberately Damage Feature	Equal variances assumed	16.18	0.00	2.10	70.00	0.04
	Equal variances not assumed			2.77	68.56	0.01
Deliberately Expose Feature	Equal variances assumed	8.51	0.00	1.97	70.00	0.05
	Equal variances not assumed			2.28	62.38	0.03
Deliberately Remove Feature	Equal variances assumed	31.16	0.00	2.82	70.00	0.01
	Equal variances not assumed			3.67	69.37	0.00
Accidentally Disturb Artifacts Inside Wreck	Equal variances assumed	17.23	0.00	3.10	70.00	0.00
	Equal variances not assumed			3.83	69.09	0.00
Accidentally Disturb Artifact Adjacent to Wreck	Equal variances assumed	17.69	0.00	3.28	70.00	0.00
	Equal variances not assumed			3.99	67.93	0.00
Accidentally Disturb Artifacts Away From Wreck	Equal variances assumed	15.68	0.00	3.26	70.00	0.00
	Equal variances not assumed			3.93	67.07	0.00
Handle Artifacts Inside Wreck	Equal variances assumed	3.01	0.09	2.91	70.00	0.00
	Equal variances not assumed			3.08	50.04	0.00
Handle Artifacts Adjacent to Wreck	Equal variances assumed	3.03	0.09	3.13	70.00	0.00
	Equal variances not assumed			3.34	50.78	0.00
Handle Artifacts Outside of Wreck	Equal variances assumed	4.81	0.03	3.48	70.00	0.00
	Equal variances not assumed			3.75	52.54	0.00

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Move Artifacts Inside of Wreck	Equal variances assumed	17.99	0.00	3.53	70.00	0.00
	Equal variances not assumed			4.54	69.83	0.00
Move Artifacts Adjacent to Wreck	Equal variances assumed	6.72	0.01	3.08	70.00	0.00
	Equal variances not assumed			3.47	58.45	0.00
Move Artifacts Away From Wreck	Equal variances assumed	16.92	0.00	3.65	70.00	0.00
	Equal variances not assumed			4.58	69.78	0.00
Remove Artifacts from Inside of Wreck	Equal variances assumed	36.19	0.00	3.23	70.00	0.00
	Equal variances not assumed			4.13	69.96	0.00
Remove Artifacts Adjacent to Wreck	Equal variances assumed	35.60	0.00	3.77	70.00	0.00
	Equal variances not assumed			5.03	67.26	0.00
Remove Artifacts Away From Wreck	Equal variances assumed	49.35	0.00	3.99	70.00	0.00
	Equal variances not assumed			5.35	66.43	0.00
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Equal variances assumed	11.84	0.00	2.59	70.00	0.01
	Equal variances not assumed			3.01	62.69	0.00
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Equal variances assumed	9.68	0.00	2.46	70.00	0.02
	Equal variances not assumed			2.82	60.86	0.01
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Equal variances assumed	6.86	0.01	2.42	70.00	0.02
	Equal variances not assumed			2.73	58.32	0.01

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Equal variances assumed	6.79	0.01	2.17	70.00	0.03
	Equal variances not assumed			2.49	60.87	0.02
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Equal variances assumed	8.70	0.00	2.61	70.00	0.01
	Equal variances not assumed			3.00	61.16	0.00
Excavate, handle, and return Artifacts Away From Wreck to same location	Equal variances assumed	6.93	0.01	2.71	70.00	0.01
	Equal variances not assumed			3.10	60.57	0.00
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Equal variances assumed	21.49	0.00	3.57	70.00	0.00
	Equal variances not assumed			4.76	67.32	0.00
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Equal variances assumed	19.84	0.00	3.50	70.00	0.00
	Equal variances not assumed			4.58	68.99	0.00
Excavate, handle, and return Artifacts Away From Wreck to New Location	Equal variances assumed	22.03	0.00	3.72	70.00	0.00
	Equal variances not assumed			4.89	68.60	0.00

Sustainable Actions by Divers		F Statistic	Significance	t Statistic	Degrees of Freedom	Significance
Collect Buried Artifacts Inside of Wreck	Equal variances assumed	22.48	0.00	3.22	70.00	0.00
	Equal variances not assumed			3.91	67.66	0.00
Collect Buried Artifacts Adjacent to Wreck	Equal variances assumed	43.13	0.00	3.73	70.00	0.00
	Equal variances not assumed			4.91	68.50	0.00
Collect Buried Artifacts Away From Wreck	Equal variances assumed	42.63	0.00	4.06	70.00	0.00
	Equal variances not assumed			5.34	68.50	0.00
Okay to Penetrate Wreck	Equal variances assumed	0.83	0.36	0.29	70.00	0.77
	Equal variances not assumed			0.30	44.59	0.77
Okay to Penetrate Wreck on Open-Circuit Scuba	Equal variances assumed	0.00	0.98	0.52	70.00	0.60
	Equal variances not assumed			0.51	40.62	0.61
Okay to Penetrate Wreck on Closed-Circuit rebreather	Equal variances assumed	15.39	0.00	-0.99	70.00	0.32
	Equal variances not assumed			-1.19	66.64	0.24

APPENDIX U: Means and Standard Deviations of Number of Years Diving on Shipwrecks

	How many total years have you been scuba diving on shipwrecks?									
	0-10 Years (n=48)		11-20 Years (n=21)		21-30 Years (n=10)		31-40 Years (n=6)		More Than 40 Years (n=2)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Anchor to Structure	3.33	2.05	4.05	2.18	4.20	2.35	4.83	1.72	3.50	3.54
Anchor in Sediment	5.08	1.82	4.43	2.11	4.40	1.51	4.50	2.26	6.50	0.71
Only Anchor to Mooring Buoy	5.04	1.87	4.05	2.27	3.90	2.64	3.50	2.95	1.50	0.71
Only Live-Boating, No Anchor	4.56	2.11	3.90	1.92	2.90	1.85	4.00	2.53	3.50	3.54
Accidentally Damage Structure	2.19	1.33	2.52	1.60	3.00	2.00	3.67	2.16	3.50	2.12
Accidentally Expose Structure	2.64	1.54	2.67	1.65	3.22	2.11	4.00	2.19	4.00	1.41
Deliberately Damage Structure	1.17	0.67	1.71	1.87	2.33	1.58	2.50	2.51	3.50	3.54
Deliberately Expose Structure	2.09	1.67	2.57	2.13	2.89	2.32	5.17	2.40	5.50	0.71
Deliberately Remove Structure	1.60	1.25	2.86	2.26	2.78	2.33	5.17	2.40	4.00	1.41
Accidentally Damage Feature	2.26	1.26	2.62	1.69	3.20	1.87	3.67	2.50	4.00	1.41
Accidentally Expose Feature	2.54	1.46	2.76	1.55	3.10	1.91	4.00	2.19	4.00	1.41
Deliberately Damage Feature	1.17	0.48	1.71	1.55	2.50	1.43	3.33	2.73	3.00	2.83
Deliberately Expose Feature	2.00	1.54	2.62	2.11	3.10	2.18	5.17	2.40	5.00	0.00
Deliberately Remove Feature	1.69	1.46	2.62	2.01	3.00	2.21	5.33	2.42	4.50	0.71
Accidentally Disturb Artifacts Inside Wreck	2.72	1.87	2.76	1.70	3.70	1.83	4.00	2.53	3.50	2.12
Accidentally Disturb Artifact Adjacent to Wreck	2.98	1.89	2.90	1.76	3.70	1.83	4.00	2.53	4.50	0.71
Accidentally Disturb Artifacts Away From Wreck	3.13	2.00	3.05	1.88	4.00	2.00	4.00	2.53	5.00	0.00
Handle Artifacts Inside Wreck	2.94	2.00	3.76	2.23	3.60	2.07	5.83	2.04	5.00	0.00
Handle Artifacts Adjacent to Wreck	3.09	2.06	3.76	2.32	3.90	2.02	5.83	2.04	5.00	0.00
Handle Artifacts Outside of Wreck	3.17	2.05	3.67	2.22	3.90	2.02	5.83	2.04	3.50	2.12
Move Artifacts Inside of Wreck	2.09	1.73	2.38	1.77	3.00	2.05	4.67	2.73	3.50	2.12
Move Artifacts Adjacent to Wreck	2.19	1.85	2.57	2.04	3.10	1.97	4.67	2.73	4.50	0.71
Move Artifacts Away From Wreck	2.15	1.74	2.52	1.94	3.50	2.27	4.67	2.73	3.00	2.83
Remove Artifacts from Inside of Wreck	2.02	1.89	2.81	2.18	3.40	2.32	5.33	2.42	3.50	2.12
Remove Artifacts Adjacent to Wreck	2.09	1.89	2.80	2.24	3.30	1.83	5.33	2.42	2.00	0.00
Remove Artifacts Away From Wreck	2.21	2.01	2.81	2.18	3.60	2.17	5.33	2.42	3.50	2.12
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	3.24	1.83	3.50	1.65	3.60	2.01	4.50	2.35	3.50	2.12

	0-10 Years (n=48)		11-20 Years (n=21)		21-30 Years (n=10)		31-40 Years (n=6)		More Than 40 Years (n=2)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.48	1.85	3.50	1.65	3.89	1.90	4.50	2.35	3.50	2.12
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.56	1.77	3.33	1.61	3.60	2.01	4.50	2.35	3.50	2.12
Excavate, handle, and return Artifacts from Inside of Wreck to same location	2.70	1.79	3.35	2.23	3.30	1.89	5.17	2.40	5.00	0.00
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	2.85	1.86	3.06	2.11	3.40	1.78	5.17	2.40	5.00	0.00
Excavate, handle, and return Artifacts Away From Wreck to same location	2.89	1.92	2.94	2.11	3.50	1.72	5.17	2.40	5.00	0.00
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	2.02	1.60	2.65	2.09	3.10	2.23	4.67	2.73	3.50	2.12
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	2.07	1.67	2.65	2.09	2.90	1.73	4.67	2.73	3.50	2.12
Excavate, handle, and return Artifacts Away From Wreck to New Location	2.11	1.72	2.71	2.05	3.30	2.11	4.67	2.73	3.50	2.12
Collect Buried Artifacts Inside of Wreck	2.07	1.77	2.82	2.19	3.40	2.32	5.33	2.42	3.50	2.12
Collect Buried Artifacts Adjacent to Wreck	2.09	1.76	2.94	2.21	3.40	2.32	5.33	2.42	3.50	2.12
Collect Buried Artifacts Away From Wreck	2.15	1.85	2.88	2.15	3.80	2.20	5.33	2.42	3.50	2.12
Okay to Penetrate Wreck	5.66	1.09	5.47	1.35	6.00	1.00	6.83	0.41	6.50	0.71
Okay to Penetrate Wreck on Open-Circuit Scuba	5.15	1.41	5.26	1.56	5.78	1.09	5.83	1.60	6.50	0.71
Okay to Penetrate Wreck on Closed-Circuit rebreather	5.83	1.17	5.53	1.35	5.44	1.94	6.83	0.41	6.50	0.71

APPENDIX V: Welch and Brown-Forsythe's Test of Equality of Means for Number of Years Diving

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Only Anchor to Mooring Buoy	Welch	7.86	4.00	7.85	0.01
	Brown-Forsythe	2.27	4.00	22.24	0.09
Deliberately Damage Structure	Welch	1.58	4.00	5.90	0.29
	Brown-Forsythe	1.12	4.00	3.42	0.47
Deliberately Remove Structure	Welch	4.40	4.00	6.19	0.05
	Brown-Forsythe	5.19	4.00	21.09	0.00
Accidentally Damage Feature	Welch	1.28	4.00	6.27	0.37
	Brown-Forsythe	1.45	4.00	15.87	0.26
Deliberately Damage Feature	Welch	2.82	4.00	5.93	0.13
	Brown-Forsythe	2.11	4.00	4.81	0.22
Deliberately Expose Feature	Welch				
	Brown-Forsythe				
Deliberately Remove Feature	Welch	7.57	4.00	7.22	0.01
	Brown-Forsythe	6.25	4.00	23.32	0.00
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Welch	1.56	4.00	6.19	0.29
	Brown-Forsythe	2.21	4.00	12.90	0.13
Okay to Penetrate Wreck	Welch	6.16	4.00	6.91	0.02
	Brown-Forsythe	3.06	4.00	26.04	0.03

APPENDIX W: ANOVA Results for Number of Years Diving

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Anchor to Structure	Between Groups	19.26	4.00	1.07	0.38
	Within Groups	368.55	82.00		
	Total	387.82	86.00		
Anchor in Sediment	Between Groups	14.54	4.00	1.02	0.40
	Within Groups	291.21	82.00		
	Total	305.75	86.00		
Only Live-Boating, No Anchor	Between Groups	26.04	4.00	1.49	0.21
	Within Groups	359.02	82.00		
	Total	385.06	86.00		
Accidentally Damage Structure	Between Groups	16.90	4.00	1.76	0.15
	Within Groups	192.35	80.00		
	Total	209.25	84.00		
Accidentally Expose Structure	Between Groups	14.62	4.00	1.30	0.28
	Within Groups	225.07	80.00		
	Total	239.69	84.00		
Deliberately Expose Structure	Between Groups	69.56	4.00	4.78	0.00
	Within Groups	291.02	80.00		
	Total	360.59	84.00		
Accidentally Expose Feature	Between Groups	15.65	4.00	1.55	0.19
	Within Groups	206.63	82.00		
	Total	222.28	86.00		
Accidentally Disturb Artifacts Inside Wreck	Between Groups	16.00	4.00	1.13	0.35
	Within Groups	285.81	81.00		
	Total	301.81	85.00		
Accidentally Disturb Artifact Adjacent to Wreck	Between Groups	13.65	4.00	0.95	0.44
	Within Groups	289.39	81.00		
	Total	303.03	85.00		
Accidentally Disturb Artifacts Away From Wreck	Between Groups	16.34	4.00	1.03	0.40
	Within Groups	322.19	81.00		
	Total	338.52	85.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Handle Artifacts Inside Wreck	Between Groups	53.54	4.00	3.15	0.02
	Within Groups	343.85	81.00		
	Total	397.40	85.00		
Handle Artifacts Adjacent to Wreck	Between Groups	47.73	4.00	2.68	0.04
	Within Groups	361.20	81.00		
	Total	408.93	85.00		
Handle Artifacts Outside of Wreck	Between Groups	39.54	4.00	2.26	0.07
	Within Groups	353.54	81.00		
	Total	393.08	85.00		
Move Artifacts Inside of Wreck	Between Groups	41.01	4.00	2.96	0.02
	Within Groups	280.45	81.00		
	Total	321.45	85.00		
Move Artifacts Adjacent to Wreck	Between Groups	43.18	4.00	2.79	0.03
	Within Groups	313.15	81.00		
	Total	356.34	85.00		
Move Artifacts Away From Wreck	Between Groups	43.73	4.00	2.88	0.03
	Within Groups	307.03	81.00		
	Total	350.76	85.00		
Remove Artifacts from Inside of Wreck	Between Groups	69.38	4.00	4.10	0.00
	Within Groups	342.45	81.00		
	Total	411.83	85.00		
Remove Artifacts Adjacent to Wreck	Between Groups	63.27	4.00	3.93	0.01
	Within Groups	318.29	79.00		
	Total	381.56	83.00		
Remove Artifacts Away From Wreck	Between Groups	62.01	4.00	3.51	0.01
	Within Groups	357.34	81.00		
	Total	419.35	85.00		
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Between Groups	8.93	4.00	0.65	0.63
	Within Groups	265.27	77.00		
	Total	274.20	81.00		
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Between Groups	6.49	4.00	0.47	0.76
	Within Groups	260.87	76.00		
	Total	267.36	80.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Between Groups	6.22	4.00	0.47	0.76
	Within Groups	249.51	76.00		
	Total	255.73	80.00		
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Between Groups	41.67	4.00	2.78	0.03
	Within Groups	284.55	76.00		
	Total	326.22	80.00		
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Between Groups	36.08	4.00	2.42	0.06
	Within Groups	280.11	75.00		
	Total	316.19	79.00		
Excavate, handle, and return Artifacts Away From Wreck to same location	Between Groups	36.11	4.00	2.34	0.06
	Within Groups	292.73	76.00		
	Total	328.84	80.00		
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Between Groups	40.80	4.00	2.94	0.03
	Within Groups	263.42	76.00		
	Total	304.22	80.00		
Excavate, handle, and return Artifacts Away From Wreck to New Location	Between Groups	43.08	4.00	2.89	0.03
	Within Groups	279.91	75.00		
	Total	322.99	79.00		
Collect Buried Artifacts Inside of Wreck	Between Groups	66.49	4.00	4.22	0.00
	Within Groups	299.51	76.00		
	Total	366.00	80.00		
Collect Buried Artifacts Adjacent to Wreck	Between Groups	65.98	4.00	4.20	0.00
	Within Groups	294.82	75.00		
	Total	360.80	79.00		
Collect Buried Artifacts Away From Wreck	Between Groups	68.87	4.00	4.29	0.00
	Within Groups	305.13	76.00		
	Total	374.00	80.00		
Okay to Penetrate Wreck on Open-Circuit Scuba	Between Groups	7.69	4.00	0.95	0.44
	Within Groups	158.53	78.00		
	Total	166.22	82.00		
Okay to Penetrate Wreck on Closed-Circuit rebreather	Between Groups	9.98	4.00	1.53	0.20

APPENDIX X: Means and Standard Deviations of Income Range

	Income Range									
	$1,000 - $49,000 (n=20)		**$50,000 - $99,000 (n=18)**		**$100,000- $149,000 (n=13)**		**$150,000 - $199,000 (n=6)**		**$200,000 - $249,000 (n=5)**	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Anchor to Structure	2.65	1.76	3.94	1.98	3.69	2.66	4.50	1.87	3.40	2.30
Anchor in Sediment	4.65	1.60	5.17	2.04	4.38	1.98	5.17	1.94	4.60	1.14
Only Anchor to Mooring Buoy	5.00	1.72	4.39	2.17	5.46	2.18	3.17	2.14	4.40	3.13
Only Live-Boating, No Anchor	4.55	1.82	4.61	2.03	3.85	2.34	2.50	1.64	4.20	2.17
Accidentally Damage Structure	2.15	1.09	2.22	1.52	3.08	2.06	2.67	1.63	2.60	2.61
Accidentally Expose Structure	2.40	1.31	2.56	1.46	3.54	1.98	3.17	2.14	3.00	2.55
Deliberately Damage Structure	1.20	0.70	1.50	1.54	1.92	1.93	1.67	1.21	2.20	2.68
Deliberately Expose Structure	2.05	1.50	2.50	2.36	3.15	2.58	2.83	2.40	2.60	2.61
Deliberately Remove Structure	1.40	0.82	2.72	2.47	3.00	2.55	2.67	2.42	2.20	2.68
Accidentally Damage Feature	2.20	1.11	2.33	1.50	3.38	1.98	2.83	1.94	2.60	2.51
Accidentally Expose Feature	2.40	1.27	2.50	1.38	3.69	2.06	2.83	1.94	3.20	2.28
Deliberately Damage Feature	1.20	0.70	1.50	1.54	1.69	1.03	2.67	2.07	2.20	2.68
Deliberately Expose Feature	1.65	0.88	2.56	2.41	3.15	2.58	2.83	2.40	2.60	2.61
Deliberately Remove Feature	1.15	0.67	2.56	2.20	2.92	2.50	2.83	2.40	2.20	2.68
Accidentally Disturb Artifacts Inside Wreck	2.45	1.39	2.44	1.69	3.77	2.31	3.67	2.42	3.60	1.95
Accidentally Disturb Artifact Adjacent to Wreck	2.75	1.55	2.50	1.65	4.15	2.15	3.67	2.42	3.40	2.07
Accidentally Disturb Artifacts Away From Wreck	2.90	1.62	2.72	1.87	4.31	2.29	3.83	2.64	3.60	2.30
Handle Artifacts Inside Wreck	2.50	1.61	3.17	2.38	3.77	2.20	4.17	3.13	3.00	2.35
Handle Artifacts Adjacent to Wreck	2.80	1.77	3.22	2.46	3.85	2.27	4.17	3.13	3.40	2.51
Handle Artifacts Outside of Wreck	2.85	1.73	3.17	2.28	4.00	2.27	4.17	3.13	3.40	2.51
Move Artifacts Inside of Wreck	1.90	1.29	2.50	2.20	2.69	1.93	3.33	2.73	2.20	2.68
Move Artifacts Adjacent to Wreck	2.10	1.68	2.78	2.41	2.69	1.93	3.33	2.73	2.40	2.61
Move Artifacts Away From Wreck	2.10	1.52	2.72	2.32	2.77	2.17	3.33	2.73	2.60	2.61
Remove Artifacts from Inside of Wreck	1.75	1.37	2.67	2.43	3.15	2.73	3.33	2.73	2.20	2.68
Remove Artifacts Adjacent to Wreck	1.70	1.22	2.72	2.40	3.15	2.51	3.33	2.73	2.60	2.61
Remove Artifacts Away From Wreck	1.80	1.40	2.72	2.40	3.69	2.78	3.33	2.73	2.60	2.61
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	2.90	1.45	2.94	1.73	4.08	2.22	3.50	2.26	3.00	2.35
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	3.25	1.48	3.00	1.68	4.23	2.28	3.50	2.26	3.00	2.35

	$1,000 - $49,000 (n=20)		$50,000 - $99,000 (n=18)		$100,000- $149,000 (n=13)		$150,000 - $199,000 (n=6)		$200,000 - $249,000 (n=5)	
Sustainable Actions by Divers	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	3.35	1.60	3.17	1.54	4.23	2.28	3.50	2.26	3.00	2.35
Excavate, handle, and return Artifacts from Inside of Wreck to same location	2.45	1.36	3.00	2.11	3.23	2.35	3.33	2.42	2.80	2.49
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	2.65	1.57	3.06	2.07	3.38	2.40	3.33	2.42	2.80	2.39
Excavate, handle, and return Artifacts Away From Wreck to same location	2.70	1.56	3.00	2.11	3.54	2.50	3.33	2.42	3.00	2.35
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	1.90	1.17	2.67	2.11	3.15	2.73	3.17	2.32	2.20	2.68
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	2.00	1.38	2.67	2.11	2.92	2.50	3.17	2.32	2.40	2.61
Excavate, handle, and return Artifacts Away From Wreck to New Location	2.05	1.50	2.67	2.11	3.23	2.68	3.17	2.32	2.80	2.49
Collect Buried Artifacts Inside of Wreck	2.00	1.45	2.78	2.24	3.15	2.73	3.33	2.73	2.20	2.68
Collect Buried Artifacts Adjacent to Wreck	1.95	1.32	2.83	2.20	3.23	2.80	3.33	2.73	2.20	2.68
Collect Buried Artifacts Away From Wreck	2.00	1.45	2.83	2.20	3.38	2.84	3.33	2.73	3.20	2.68
Okay to Penetrate Wreck	5.15	1.14	5.72	1.13	6.08	1.04	6.33	1.03	5.40	1.52
Okay to Penetrate Wreck on Open-Circuit Scuba	4.60	1.35	5.22	1.48	5.62	1.80	6.00	0.89	5.00	1.41
Okay to Penetrate Wreck on Closed-Circuit rebreather	5.55	1.10	5.61	1.50	6.15	0.99	6.33	1.03	5.80	1.64

APPENDIX Y: Welch and Brown-Forsythe's Test of Equality of Means for Income Range

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Deliberately Damage Structure	Welch				
	Brown-Forsythe				
Deliberately Expose Structure	Welch	1.67	4.00	15.49	0.21
	Brown-Forsythe	1.83	4.00	20.79	0.16
Deliberately Remove Structure	Welch	2.38	4.00	15.25	0.10
	Brown-Forsythe	2.23	4.00	26.04	0.09
Deliberately Damage Feature	Welch	1.62	4.00	17.95	0.21
	Brown-Forsythe	4.51	4.00	32.44	0.01
Deliberately Expose Feature	Welch	2.43	4.00	15.83	0.09
	Brown-Forsythe	2.77	4.00	16.92	0.06
Deliberately Remove Feature	Welch	3.51	4.00	15.43	0.03
	Brown-Forsythe	3.41	4.00	19.59	0.03
Accidentally Disturb Artifacts Inside Wreck	Welch	1.25	4.00	15.65	0.33
	Brown-Forsythe	1.03	4.00	13.89	0.43
Handle Artifacts Inside Wreck	Welch	1.56	4.00	15.80	0.23
	Brown-Forsythe	1.40	4.00	20.21	0.27
Handle Artifacts Adjacent to Wreck	Welch	1.45	4.00	15.86	0.26
	Brown-Forsythe	1.35	4.00	21.55	0.28
Handle Artifacts Outside of Wreck	Welch	1.31	4.00	16.21	0.31
	Brown-Forsythe	1.30	4.00	24.99	0.30
Remove Artifacts from Inside of Wreck	Welch	2.01	4.00	15.26	0.14
	Brown-Forsythe	1.65	4.00	15.77	0.21
Remove Artifacts Adjacent to Wreck	Welch	1.86	4.00	15.59	0.17
	Brown-Forsythe	1.74	4.00	17.19	0.19

Sustainable Actions by Divers	Test	Adjusted F Statistic	df1	df2	Significance
Remove Artifacts Away From Wreck	Welch	1.44	4.00	15.81	0.27
	Brown-Forsythe	1.46	4.00	19.42	0.25
Excavate, handle, and return Artifacts from Inside of Wreck to New Location	Welch	1.00	4.00	16.03	0.44
	Brown-Forsythe	1.13	4.00	17.04	0.37
Collect Buried Artifacts Inside of Wreck	Welch	1.74	4.00	15.20	0.19
	Brown-Forsythe	1.48	4.00	15.16	0.26
Collect Buried Artifacts Adjacent to Wreck	Welch	1.71	4.00	15.80	0.20
	Brown-Forsythe	1.78	4.00	16.75	0.18
Collect Buried Artifacts Away From Wreck	Welch	1.99	4.00	16.00	0.15
	Brown-Forsythe	2.01	4.00	17.03	0.14

APPENDIX Z: ANOVA Results for Income Range

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Anchor to Structure	Between Groups	24.52	4.00	1.40	0.24
	Within Groups	248.96	57.00		
	Total	273.48	61.00		
Anchor in Sediment	Between Groups	6.11	4.00	0.46	0.77
	Within Groups	190.16	57.00		
	Total	196.27	61.00		
Only Anchor to Mooring Buoy	Between Groups	25.64	4.00	1.43	0.24
	Within Groups	255.54	57.00		
	Total	281.18	61.00		
Only Live-Boating, No Anchor	Between Groups	24.46	4.00	1.51	0.21
	Within Groups	231.22	57.00		
	Total	255.68	61.00		
Accidentally Damage Structure	Between Groups	8.24	4.00	0.77	0.55
	Within Groups	153.12	57.00		
	Total	161.35	61.00		
Accidentally Expose Structure	Between Groups	12.37	4.00	1.07	0.38
	Within Groups	165.31	57.00		
	Total	177.68	61.00		
Accidentally Damage Feature	Between Groups	12.79	4.00	1.20	0.32
	Within Groups	152.31	57.00		
	Total	165.10	61.00		
Accidentally Expose Feature	Between Groups	15.97	4.00	1.48	0.22
	Within Groups	153.70	57.00		
	Total	169.68	61.00		
Accidentally Disturb Artifact Adjacent to Wreck	Between Groups	25.73	4.00	1.89	0.13
	Within Groups	194.48	57.00		
	Total	220.21	61.00		
Accidentally Disturb Artifacts Away From Wreck	Between Groups	24.56	4.00	1.53	0.20
	Within Groups	228.21	57.00		
	Total	252.77	61.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Move Artifacts Inside of Wreck	Between Groups	11.72	4.00	0.74	0.57
	Within Groups	225.20	57.00		
	Total	236.92	61.00		
Move Artifacts Adjacent to Wreck	Between Groups	9.03	4.00	0.49	0.74
	Within Groups	262.21	57.00		
	Total	271.24	61.00		
Move Artifacts Away From Wreck	Between Groups	8.84	4.00	0.49	0.74
	Within Groups	256.25	57.00		
	Total	265.10	61.00		
Accidentally Disturb Sediments Exposing Artifacts Inside of Wreck	Between Groups	13.67	4.00	0.99	0.42
	Within Groups	197.17	57.00		
	Total	210.84	61.00		
Accidentally Disturb Sediments Exposing Artifacts Adjacent to Wreck	Between Groups	13.15	4.00	0.94	0.45
	Within Groups	199.56	57.00		
	Total	212.71	61.00		
Accidentally Disturb Sediments Exposing Artifacts Away From Wreck	Between Groups	10.58	4.00	0.76	0.56
	Within Groups	198.86	57.00		
	Total	209.44	61.00		
Excavate, handle, and return Artifacts from Inside of Wreck to same location	Between Groups	6.82	4.00	0.42	0.79
	Within Groups	231.39	57.00		
	Total	238.21	61.00		
Excavate, handle, and return Artifacts Adjacent to Wreck to same location	Between Groups	5.30	4.00	0.31	0.87
	Within Groups	240.70	57.00		
	Total	246.00	61.00		
Excavate, handle, and return Artifacts Away From Wreck to same location	Between Groups	6.09	4.00	0.35	0.84
	Within Groups	248.76	57.00		
	Total	254.85	61.00		
Excavate, handle, and return Artifacts from Adjacent to Wreck to New Location	Between Groups	10.48	4.00	0.62	0.65
	Within Groups	240.96	57.00		
	Total	251.44	61.00		

Sustainable Actions by Divers		Sum of Squares	df	F	Sig.
Excavate, handle, and return Artifacts Away From Wreck to New Location	Between Groups	13.30	4.00	0.74	0.57
	Within Groups	256.89	57.00		
	Total	270.19	61.00		
Okay to Penetrate Wreck	Between Groups	10.58	4.00	2.05	0.10
	Within Groups	73.62	57.00		
	Total	84.19	61.00		
Okay to Penetrate Wreck on Open-Circuit Scuba	Between Groups	13.40	4.00	1.55	0.20
	Within Groups	122.99	57.00		
	Total	136.39	61.00		
Okay to Penetrate Wreck on Closed-Circuit rebreather	Between Groups	5.22	4.00	0.84	0.51
	Within Groups	89.05	57.00		
	Total	94.27	61.00		