The Effectiveness of Ecotourism as an Ecological Restoration Tool: Exploring Function, Proximity and Feasibility in The Chesapeake Bay Watershed

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ABSTRACT

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The study of ecotourism as an ecological restoration tool provides an interdisciplinary approach to analyzing the relationship between the environment and public demand for a good or service. Through the literary synthesis of definitions of the terms *ecotourism* and *ecological restoration*, a framework is developed which highlights the opportunity for ecotourism operations to enhance ecological restoration efforts at a given local. Using the Chesapeake Bay Watershed as a case study for this understanding, GIS distance buffer methodology is applied to determine the number and identities of Chesapeake Bay Gateways Network (CBGN) ecotourism sites found within close proximity to mapped NOAA ecological restoration sites in the lower Bay Watershed. Of the mapped CBGN ecotourism sites, 47%, 63%, and 77% are located within 5-, 10-, and 15 miles of NOAA-supported restoration locations, respectively. The further analysis of the ecotourism-ecological restoration relationship cluster areas of four Bay area cities – Baltimore, MD; Annapolis, MD; Solomons, MD; and Norfolk, VA – identifies a potential network bridge of educators, volunteers and field scientists between the ecotourism operations and restoration activity in the Bay. Ultimately, the GIS proximity model can be expanded upon within the Chesapeake Bay Watershed, as well as applied to other geographic ecosystems experiencing a gap between tourism and ecotourism operations and ecological restoration activity.

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"… you are not truly engaged with a place, especially a wild place,
without being there on its terms, not yours." –Eric Higgs, 2003.

Chapter 1
Introduction

Understanding the ideas of ecological restoration and ecotourism has resulted in a number of evolving discussions of each individual term. As a result, definitions in relation to the terms in general, project goals, and participants remain unclear and variable. This variation is ultimately due to the span of each study over a number of disciplines as each term and its accompanying subject matter consists of both environmental and societal interactions. Although both terms involve reference to the natural environment, societal functions such as physical interaction and derived economic benefit also serve as factors in understanding the terms. As a result, analysis of each term requires attention to this interdisciplinary interaction between natural science and social science subject matter. Thus, through the literary synthesis of previously published definitions of the terms *ecological restoration* and *ecotourism*, a progressive step can be made in the understanding of how these separate environment-based operations can work in conjunction with one another with the end goal of maintaining the environmental integrity of a natural area while still holding a societal benefit to the communities surrounding that area, through both natural resource restoration and generated economic revenue.

1.1 Significance of Study

1.1.1 *Exploring Ecological Restoration*

The idea of ecological restoration and its respective definition is not a simple entity. Instead, a variety of opinions exist in regard to at what state an area can be considered restored, based not only on species presence or absence but also on ecosystem functionality. As a result, a firm universal definition of restoration is seemingly unattainable. Higgs states, "The paradigm in ecology has shifted in the last twenty years from one in which equilibrium defined the end point of ecological change to one in which ecosystems are disequilibrium systems with complicated multiple trajectories and multiple steady states."[1] This outlook raises the question of whether authorities in the field should accept the lack of uniformity in opinion and definition, or if they should instead strive to determine a generalized understanding of the concept of ecological restoration in order to enhance knowledge regarding endpoint and goals of the activity. Ultimately, the process of setting an endpoint to restoration activity will vary based on an individual research area and the history of its ecological function.

However, even with this variation, the resulting social implications which accompany any restoration project are likely to be standard over a majority of project sites as the nature of restoration ecology is interdisciplinary in itself. Many ecological restoration efforts are located in development-disturbed areas, thus connecting social actions with the natural world. Higgs states:

> …[to] restore successfully in the long run, people need to be strongly committed to restoration[2] [since] animals and plants do not typically require management. Rather, most of the emphasis must be on designing experience for the visitors and dwellers that emphasize long-term responsibility, respectful action, and contribution, material or otherwise, to the flourishing of ecosystems.[3]

The result of these actions will lead to a natural world which is able to not only coexist with human society, but to also thrive in its overlap.

A complete understanding of what ecological restoration is, and how to determine whether or not a project can be considered complete, will help to serve as a baseline for determining how restoration projects can interact with other operations. For the purpose of this study, the formulation of a synthesized definition of ecological restoration, derived from the examination of past definitions and research, aids in the analysis of the opportunity for ecotourism to aid in ecological restoration efforts.

1.1.2 *Exploring Ecotourism*

Similar to the discussion of ecological restoration, the concept of ecotourism bridges a gap between two distinct disciplines. The natural science aspect of ecosystem environments comprises one discipline, while the social science aspect of the economic

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[1] E. Higgs, *Nature by Design: People, Natural Processes, and Ecological Restoration* (Cambridge, MA: The MIT Press, 2003), 141.
[2] Higgs, *Nature by Design*, 4.
[3] Higgs, *Nature by Design*, 264.

implications which come along with general tourist practices comprises the second. This span of disciplines results in a variety of understandings of the term as definitions or research are biased in the direction of one discipline over the other.

In order to formulate a concrete understanding of ecotourism impacts, in terms of both nature and society, a definition of the term must first be understood. In a 2003 publication, Edwards *et al*. performed a census of North American government entities including USA and Canada, as well as Latin America and the Caribbean (LAC). Key findings resulting from the census note that a variety of definitions exist, many of which have been developed by the local—state, province, territory—governments in order to "meet its needs or understanding of ecotourism as opposed to a 'standard' definition taken from another source, such as the tourism research literature or a professional tourism organization."[4] These findings exemplify a key issue in the study of ecotourism. Without a standard definition, the term and its associated activities can be loosely interpreted resulting in a misrepresentation of advertised ecotourism practices. While this is less likely to result in a negative impact to the visitors or local populations taking part in such activity, the misrepresentation has the potential to result in negative effects on the natural environment of that area.

Similar in terms of the exploration of ecological restoration, the formulation of a definition of ecotourism derived from previously published definitions and research will help to more completely understand of what ecotourism is, and what constitutes an ecotourist. This defined understanding will help to serve as a baseline for determining how ecotourism operations can interact with ecological restoration project efforts, including implementation and monitoring.

1.1.3 *Understanding Economic Development and Benefits*

As previously discussed, the study of ecotourism spans both the natural and social science disciplines. Provided the root of ecotourism in general economic-based tourism practices, the economic development and benefit, or harm, of ecotourism practices to both the surrounding environment and the society involved must also be discussed.

[4] S.N. Edwards, W.J. McLaughlin and S.H. Ham, "A Regional Look at Ecotourism Policy in the Americas," in *Ecotourism Policy and Planning*, edited by D.A. Fennell and R.K. Dowling, 293-307, Cambridge, MA: CAB International (2003), 296.

According to Sinclair and Stabler (1997), the social science study of environmental economics involves:

> … the analysis of the use of exhaustible energy and productive resources (conservation economics) but also amenity use of natural resources (leisure economics – embracing sport, recreation and tourism), as well as the accepted sense of investigating the economic role of the environment and the associated caused and impact of its degradation through over-use or pollution…[5]

Ultimately, understanding ecological economics, specifically ecotourism functions, serves as a critical factor in the discussion of the potential of ecotourism locations to serve as hubs for ecological restoration aid.

1.2 Research Strategy

This study focuses on three primary ideas. First, the function of ecological restoration, ecotourism, and how the two entities are able to work with one another are explored through a synthesis and analysis of each term's past definitions and associated research. As a result, an updated, synthesized definition of each term is presented. These definitions in turn provide a framework for assessing the function of ecotourism operations to serve as a tool for local ecological restoration efforts, applied to a case study of the Chesapeake Bay Watershed (CBW).

The second focus of this study, proximity, is measured through geographical information systems (GIS) mapping methodology. The resulting maps provide a spatial reference for the analysis of distance between ecological restoration sites and ecotourism locations in the CBW.

Finally, an idea of feasibility, or coordination possibility, between ecotourism operations and ecological restoration projects is explored and discussed. Provided a clear sense of proximity between the various operating sites, potential coordination initiative can be taken into consideration and implemented, dependent on funding and personnel availability.

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[5] M.T. Sinclair and M. Stabler, *The Economics of Tourism* (London: Routledge, 1997), 155.

1.3 Overview of Thesis

This thesis aims to create a framework outlining the opportunity for ecotourism activity to enhance ecological restoration efforts at any study location using the Chesapeake Bay Watershed as a preliminary case study. Chapter 2 outlines the methodology used in order to create this framework. Chapter 3 explores past definitions of the terms *ecotourism* and *ecological restoration* resulting in updated derivative definitions of each term as they will be able to work in conjunction with one another. Additionally, the importance of local economic development as a function of ecotourism is also discussed. Chapter 4 focuses on the importance of the Chesapeake Bay Watershed as a case study site, examining Bay resources, restoration, and the associated local economic benefits. Chapter 5 applies the derived definitions and understandings discussed in Chapter 3 to a case study analysis of the Chesapeake Bay Watershed. First, an overview and analysis of the study area is presented before mapping both ecotourism and ecological restoration locations for spatial analysis using GIS software. The latter half of the chapter discusses the mapped finding, including analyses of specific ecotourism-restoration cluster groups within the mapped Watershed area. Finally, Chapter 6 summarizes the presented findings, concluding with an outline of future application possibilities.

Chapter 2
Methods

2.1 Synthesizing Definitions of Ecological Restoration and Ecotourism

In order to understand the significance of the use of ecotourism as an ecological restoration tool, the evolution of past definitions of each term was evaluated through a formal literature review. Using refereed book and journal publications, an analysis of the evolution and variation of published definitions of the terms *ecological restoration* and *ecotourism* were individually explored. The synthesized findings were then presented in corresponding tables[6] summarizing the definitions and notable characteristics for each source researched.

These summarizations were further presented through overlap visualization graphics prepared using Microsoft Office Word 2007 SmartArt tools.[7] Ven-diagram-like graphics were generated in order to depict overlapping similarities between notable characteristics of each definition and the definitions which incorporate those characteristics.

As a result of the literary syntheses and visual representations of the summarized findings, individual synthesized definitions of the terms ecological restoration and ecotourism were derived and presented, highlighting the notable characteristics represented in each definition. Additionally, a literary synthesis methodology using refereed books and journals was applied to the discussion of local economic development as an important function of ecotourism activity.

2.2 Case Study: The Chesapeake Bay Watershed

2.2.1 *Researching the Study Area*

Analysis of the opportunity for ecotourism to enhance ecological restoration in the Chesapeake Bay Watershed is based on the presence of both ecotourism and ecological restoration activity throughout the Watershed. Various Chesapeake Bay Area organizations were contacted in regard to data availability for either ecotourism

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[6] Table 3.1 and Table 3.3 present synthesized findings for the terms *ecological restoration* and *ecotourism*, respectively.
[7] Figure 3.1 and Figure 3.5 present overlap visualizations of the literary synthesis of the terms *ecological restoration* and *ecotourism*, respectively.

operations or ecological restoration activity in the area. As a result, Chesapeake Bay Gateways Network and NOAA provided ecotourism and ecological restoration site locations, respectively.

2.2.2 *GIS Mapping and Spatial Analysis*

For the purpose of this study, geographic information systems (GIS) analysis allows for a visual understanding of the opportunity for ecological restoration project and ecotourism operation sites to work with one another to reach common goals throughout the Chesapeake Bay Watershed. A base map was prepared using ESRI's ArcGIS v9.3 and the associated GIS server available through The Evergreen State College campus. An ESRI-provided Imagery World 2D layer creates the spatial base map of the Chesapeake Bay region for the study purposes. All information layers are presented in the North American Datum 1983 (NAD83) geographic coordinate system (GCS), in order to assure accurate presentation of all data points plotted.

NOAA ecological restoration site information was made available through an ArcIMS GIS data server provided by the NOAA Restoration Center. Although NOAA data provided does not depict all restoration sites throughout the Watershed, the data does provide a base level on which to work from. For the purpose of this part of the study, only NOAA restoration sites have been mapped.

Given that NOAA's Chesapeake Bay data included sites throughout the Watershed, the data was clipped using ArcGIS selection tools to only show sites in the Maryland-Virginia portion of the Watershed for this study. Sites were then categorically sorted according to project status: planning stage, implementation stage, implementation complete, and project terminated. Symbology levels were associated with the corresponding project status category types for mapping. Major cities were also mapped to provide a spatial reference on the land map.

Ecotourism locations were derived from a list of Chesapeake Bay Gateways Network (CBGN) partnership members, provided via a promotional pamphlet from CBGN. The pamphlet listed 151 of the 158 sites publicized on the organization's website. For the purpose of this primary case study, only the sites listed in the promotional pamphlet are presented through GIS mapping.

Gateway sites were manually entered into an Excel database limited by name, address, city, state, zip code, and gateway type as presented by CBGN. The completed database was imported into ArcGIS v9.3 and geocoded using the ESRI Street Map USA address locator available through The Evergreen State College GIS server. Addresses unmatched through the ESRI geocoding tool were input and mapped manually using "find" and "editing" tools in ArcGIS v9.3. The resulting data points were added to the same data layer as the successful geocoded points. All points within the ecotourism dataset were categorically sorted according to type of gateway: Gateway Regional Info Center or Hub, Gateway Site, Gateway Land Trail, or Gateway Water Trail. Symbology levels[8] were associated with corresponding Gateway category types for mapping. Major cities were also mapped to provide a spatial reference on the land map.

With ecotourism and ecological restoration locations mapped independently, overlaying the data sets provides a basis for further spatial analysis. Using near methodology functions in a GIS setting allows for identification of an area based on what features are within a set distance of a particular location. This analysis can be measured according to distance, time, or cost.[9] For the purpose of this study, analysis was performed using distance as a function of measurement. As a result, distance buffers have been chosen in order to simplify distance measurements from ecological restoration sites. Distances of 5, 10 and 15 miles have been chosen in order to account for the nearest ecotourism operation locations to restoration project locations, assuming 15 miles as the maximum willingness to travel from a tour location.

Each distance buffer was saved as a new layer file. Each layer of buffers was dissolved in order to remove overlapping edges between buffers, allowing for observation of local area spatial patterns. All layers were overlayed to create a single map featuring all distance buffers.

After mapping the chosen distance buffers, sites located within buffer spans could be selected by location using the respective "select by location" tool available in ArcGIS

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[8] Symbology levels in ArcGIS v9.3 allow for the user to change the symbol, color, and size representations of each plotted point. Each category within a single dataset can be differentiated with varying symbology settings to be presented in a legend for publishing purposes.

[9] A. Mitchell, "The ESRI Guide to GIS Analysis, Volume 1: Geographic Patterns and Relationships," (Redlands, CA: ESRI Inc., 1999), 116.

v9.3. By selecting sites in the ecotourism location layer limited to those that fall within each restoration area buffer layer, the attributes of the selected features (ecotourism sites), including number of features which fall within that buffer, were examined for further analysis and discussion of potential opportunity of ecotourism sites to work with restoration sites within each buffer proximity.

2.3 Understanding the Thesis

The review of past literature and the derivation of synthesized definitions for both *ecological restoration* and *ecotourism* yield an understanding of the opportunity for ecotourism to be applied as an aid to ecological restoration efforts can be formulated. Through a spatial analysis of the Chesapeake Bay as a case study of this research, proximity between ecological restoration sites and ecotourism activity within the Bay Watershed is presented for further analysis. With this spatial reference, specific restoration site areas and the corresponding surrounding ecotourism operations are explored and presented in order to understand the specific cooperative opportunities available in the Chesapeake Bay.

Chapter 3
Defining the Function of Ecotourism as an Ecological Restoration Tool

3.1 An Overview

Tourism is one of the largest industries in the world, with over 940 million travelers and generating one out of every 11.9 jobs in the world in 2008.[10] These numbers are expected to grow, potentially resulting in increased strains on the world's natural environment. An increase in general tourist impacts on the environment is a subject of on-going interest as researchers attempt to generate a viable way through which environmental impact can be minimized or even eliminated. In order to account for this new perception regarding human impact while participating in tourist activities, an alternative form of tourism has been developed. Although a number of other terms have been used to describe this same understanding, including nature travel, nature-oriented tourism, nature tourism, nature-based tourism, sustainable tourism, alternative tourism and special interest tourism,[11] for the purpose of this study, this type of tourism will be analyzed using the term *ecotourism*. The development of ecotourism operations has provided general tourism with the opportunity to participate in the continued effort to conserve and restore natural habitat.[12]

However, conservation and restoration efforts that make use of ecotourism as a tool may be limited, as universal definitions for the terms *restoration* and *ecotourism* have not been determined or generally accepted in reviewed literature. Three basic concepts will be explored in this section. First, the idea of restoration and its goals in relation to its definition is examined using a compilation of previously proposed definitions and root meanings. Through a review of published studies, a synthesized definition of *ecological restoration* is reached, providing a baseline for future projects. The concept of rehabilitation, its relation to restoration, and restoration techniques will also be explored. Second, the differences between standard tourism and ecotourism will

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[10] World Travel and Tourism Council, "Tourism Impact Data and Forecasts," 2007, http://www.wttc.org/eng/Tourism_Research/Tourism_Economic_Research/.
[11] Dimitrios Diamantis, "The Concept of Ecotourism: Evolution and Trends," *Current Issues in Tourism* 2, no. 2&3 (1999): 94.
[12] Eileen Gutiérrez, "Case Study 16.1: Ecotourism and Biodiversity Conservation," in *Principles of Conservation Biology, Third Edition*, ed. M.J. Groom, G.K. Meffe, C.R. Carroll and Contributers (Sinaur Associates, Inc., 2006), 599.

be explored, primarily focusing on the historical overview of the term, before leading to a proposed definition of *ecotourism*. Finally, ecotourism as a concept will be discussed as both a type of restoration technique as well as a separate, potentially negative, practice in itself.

3.2 Defining Ecological Restoration

3.2.1 *Working with the Past*

The concept of ecological restoration has been widely explored in attempts to determine what is or should be considered restoration. This includes defining the term as well as determining goals for projects based on the accepted definition. Overtime, the concept of what constitutes a restoration project often has been limited due to the goals of a particular restoration project; therefore, definitions have varied slightly between each presented definition. For instance, if a restoration project only seeks a minimal change from the present state, project goals will only reflect a minimalist definition of restoration. This discrepancy between context-based definitions and a more complete or universal definition has resulted in an inability to compare restoration projects as each project's 'completed state' has been individually defined. Understanding a synthesized definition will ultimately aid in the differentiation between various restoration projects and their goals, as a standard understanding will be presented.

Understanding the concept of *restoration* first requires examination of the root of the term as well as its related concepts. Bradshaw explores the definition of the term restoration in relation to terms including *restore*, *rehabilitation*, and *mitigation*.[13] Using the Oxford English Dictionary as a base for determining a definition in relation to proper restoration practices, these terms need to be further discussed.

The verb *restore* is defined as "to bring back to the original state or to a healthy or vigorous state" while the act of *restoration* is "the act of restoring to a former state or position or to an unimpaired or perfect condition."[14] While both definitions mention an aim for an original or perfect condition, the definition of restoration only gives the option

[13] A.D. Bradshaw, "Underlying Principles of Restoration," *Canadian Journal of Fish and Aquatic Science* 53, no. 1 (1996): 3-9.
[14] Bradshaw, "Underlying Principles of Restoration," 3.

to reach a "former state" whereas the definition of restore specifies that the state should be "healthy or vigorous." As the definition for restoration seems to be almost contradicted by the definition for its root, the need to determine a consensus definition and baseline goals for restoration projects becomes necessary.

Before determining a working definition and project framework for restoration, it is important to explore the idea of restoration in terms of ecology in order to be able to discuss its implications within environmental restoration project frameworks specifically. The idea of ecological restoration has been defined and explored using varying levels of specification. For instance, with the already environmentally conscious person in mind, Higgs (2003) presents his view of ecological restoration as interdisciplinary in nature. He argues that researchers must take into consideration both the environmental processes and human processes when projecting restoration goals. It is not enough to restore an area to its former environmental process. Without examining the human and natural history which has caused the changes in the ecosystem, a total restoration is unattainable. Higgs (2003) states:

> Ecological restoration is about making damaged ecosystems whole again by arresting invasive and weedy species, reintroducing missing plants and animals to create an intact web of life, understanding the changing historical conditions that led to present conditions, creating or rebuilding soils, eliminating hazardous substances, ripping up roads, and returning natural processes such as fire and flooding to places that thrive on these regular pulses.[15]

With this interpretation, changes in historical conditions are noted yet there is little indication of examining future implications of any completed restoration project. As a result, a particular restoration project may initially restore an ecosystem with it only to return to the non-restored state due to excessive change that has already taken place in that area.

A number of other variations of ecological restoration continue to create discrepancies regarding restoration characteristics, end goals and desired results. Kairo *et al*. notes the concept of restoration according to Morrison (1990) in which he restates:

> Restoration is the reintroduction and reestablishment of community-like groupings of native species to sites which can reasonably be expected to

[15] Higgs, *Nature by Design*, 1.

> sustain them, with the resultant vegetation demonstrating aesthetic and dynamic characteristics of the natural communities on which they are based.[16]

Morrison's understanding of ecological restoration encompasses both aesthetic and dynamic characteristics of the restoration area, yet fails to examine the reason for the restoration process. Alternatively, Higgs notes that ecologists should understand "the changing historical conditions that led to present conditions," yet fails to mention Morrison's aesthetic component.

Similar to Higgs' understanding of historical conditions, Jackson, Lopukhine and Hillyard suggest that *ecological restoration* is "the process of repairing damage caused by humans to the diversity and dynamics of indigenous ecosystems."[17] In comparison to Morrison's argument, Jackson, Lopukhine and Hillyard explore the idea that humans are the damaging factor to an area which would need to be restored without discussing any implication of the desired characteristics resulting from the restoration process.

In a 1997 *Ecological Engineering* publication, Pastorok *et al*. discuss the terms *restoration*, *rehabilitation*, and *management* in regard to each as a general restoration goal distinguished by the 1992 National Research Council:

> *Restoration* returns as ecosystem to a close approximation of its condition before it was disturbed. *Rehabilitation* improves a system to a 'good working order'. *Management* manipulates a system to ensure maintenance of one or a few functions.[18]

Pastorok *et al*. suggest the overlap of these three concepts to be a "continuum" and uses the term *restoration* throughout their project-framework study as a collective encompassment of all goals without necessarily fully distinguishing between the three. The lack of separation between terms and the decision to combine the three into one of the initial concepts only creates further misunderstanding of what restoration is or should be. By defining restoration as a continuum of restoration, rehabilitation, and

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[16] J.G. Kairo, F. Dahdouh-Guebas, J. Bosire and N. Koedam, "Restoration and Management of Mangrove Systems—A Lesson and from the East African Region," *South African Journal of Botany* 67 (2001): 383.
[17] L.L. Jackson, N. Lopoukhine and D. Hillyard, "Ecological Restoration: A Definition and Comments," *Restoration Ecology* 3, no. 2 (1995): 71.
[18] R.A. Pastorok, A. MacDonald, J.R. Sampson, P. Wilber, D.J. Yozzo and J.P. Titre, "An Ecological Decision Framework for Environmental Restoration Projects," *Ecological Engineering* 9, no. 1-2 (1997): 91.

management, Pastorok *et al*. add to the proposed need for a centralized definition of the term.

In a 1998 study, as mentioned in Kairo *et al*., Field defines restoration as "the act of bringing an ecosystem back to its original condition."[19] Again, an emphasis is placed on restoration to an original state yet there is no suggestion as to what has caused the degradation or to what characteristics should be observes at the project completion. Similarly, van Diggelen, Grootjans and Harris define restoration as the "reconstruction of a prior ecosystem."[20] However, this definition is only representative of "true" restoration and is noted as the "third and most ambitious level" of discussed restoration goals. According to van Diggelen, Grootjans and Harris:

> The first level is sometimes called *reclamation* and consists of attempt to increase biodiversity per se, often in highly disturbed sites… The landscape as a whole would benefit from implementing such measures but reclamation does not necessarily contribute to the protection of red list species. The second goal is often called *rehabilitation* and consists of the reintroduction of certain ecosystem functions… Rehabilitation would make the landscape as a whole more "natural," but it would not necessarily result in a significant increase in biodiversity.[21]

It seems as though that only after the first two levels of restoration goals are attempted that "true" restoration would be considered and option. This review develops the understanding that a hierarchy of restoration goals, such as the one mentioned by van Diggelen, Grootjans and Harris, becomes a necessary component to proposing a more centralized definition of restoration in relation to project efforts.

The Society for Ecological Restoration (SER) helps to bridge the gap of points missing in a comprehensive definition of restoration. The 2002, and updated 2004, publication of the SER Primer of Ecological Restoration states the goal of restoration as "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."[22] According to the SER Primer, a restored ecosystem is defined as:

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[19] Kairo *et al*., "Restoration and Management of Mangrove Systems," 383.
[20] R. van Diggelen, A.P. Grootjans and J.A. Harris, "Ecological Restoration: State of the Art or State of the Science?" *Restoration Ecology* 9, no. 2 (2001): 116.
[21] van Diggelen, Grootjans and Harris, "Ecological Restoration," 115-116.
[22] M.A. Davis and L.B. Slobodkin, "The Science and Values of Restoration Ecology," *Restoration Ecology* 12, no. 1 (2004): 1. and D.M. Campbell-Hunt, "Ecotourism and Sustainability in Community-Driven

> [One] that contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It will sustain itself structurally and functionally. It will demonstrate resilience to normal ranges of environmental stress and disturbance. It will interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural intentions.[23]

The desirable implication of the SER restoration goal lies in the idea that restoration should be attempted given that an ecosystem has been degraded, damaged, or destroyed with no specification as to whether humans had a hand in the process or if it was a result of natural succession or disaster. However, the Primer discusses how to determine whether or not an ecosystem has reached a restored state. Yet, in comparison to Morrison the SER definition still lacks an aesthetic component and, in relation to Higgs, makes no reference to the concept of the "changing historical conditions" which may have left an environment in a potentially non-restorable state.

After discussion of the 2002 SER restoration goals, Davis and Slobodkin suggest that "ecological restoration is the process of restoring one or more valued processes or attributes of a landscape."[24] Similarly, Higgs presents the understanding that ecological restoration ultimately involves a "process of recovery" through which "restorationists work to accelerate natural processes, creating conditions in an instant which might take years, decades, or centuries to occur without intervention" while directing "recovery processes… toward specific ends determined by the restorationist."[25] While these views help to provide a simplistic understanding of restoration projects and applicable goal, they also risk the argument of oversimplification as they fail to mention which characteristics should be expected at the outcome of the project. The simplification of Davis and Slobodkin's definition leaves room for further interpretation as "valued processes" can include the aesthetic as well as purely natural value of a restored landscape. Alternatively, Higgs understanding leaves the end state of restoration to the

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Ecological Restoration: Case Studies from New Zealand," in *Sustainable Tourism III: Ecology and the Environment vol. 115*, ed. C.A. Brebbia and F.D. Pineda (WIT Press, 2008), 232.

[23] Society for Ecological Restoration International Science & Policy Working Group, *The SER International Primer on Ecological Restoration* (www.ser.org & Tuscon: Society for Ecological Restoration International, 2004), 3.

[24] Davis and Slobodkin, "The Science and Values of Restoration Ecology," 2.

[25] Higgs, *Nature by Design*, 112.

project leader. While this act is not in itself an unsuitable view, it again leaves little room for project status comparison between restoration sites.

The definitions presented and discussed reveal a number of discrepancies between published definitions. While some definitions of the term *ecological restoration* incorporate ideas of aesthetic and dynamic functions of the habitat being restored, other definitions fail to differentiate between humans or natural environmental fluctuations as the root cause of destruction leading to the need for the project. The simplification of many of these published definitions creates the need for a specified definition to be synthesized in order to maximize the potential success of an ecological restoration project.

3.2.2 *Understanding Ecological Restoration: A Synthesized Definition*

The definitions and views discussed above vary in both depth and specificity creating the need for a synthesized definition of what restoration is and at what point an ecosystem can characteristically be considered restored. This variety of views is delineated through a listing of each explored source, its accompanying definition, and notable characteristics derived from the presented definition (Table 3.1). The sources and definitions listed are presented based on the order in which they have previously been discussed. This overall analysis of each source and its definition process provides a baseline approach to the derivation of a collective definition and discussion of the term *restoration*.

Table 3.1: Varying definitions of *restoration* and notable characteristics.

Source	Definition	Notable Characteristics
Bradshaw (1996) Using Oxford English Dictionary	– to bring back to the original state or to a healthy or vigorous state –the act of restoring to a former state or position or to an unimpaired or perfect condition	- reach former state - healthy or vigorous state

Table 3.1: Various source and definitions explored through a literary synthesis of definitions of the term restoration. Notable characteristics have been derived from the presented definitions.

Table 3.1: Varying definitions of *restoration* and notable characteristics.		
Source	**Definition**	**Notable Characteristics**
Higgs (2003)	– making damaged ecosystems whole again through various methods – process of recovery which accelerates natural processes, creating conditions in an instant which might take years, decades, or centuries to occur without intervention	- invasive arrest/ removal, plant/animal reintroduction, rebuild soils, eliminate hazards, road removal, natural process returns - understanding changing historical conditions which led to present conditions
Morrison (1990)	– reintroduction and reestablishment of community-like groupings of native species to sites which can reasonably be expected to sustain them – resultant vegetation demonstrating aesthetic and dynamic characteristics of the natural communities on which they are based	- native species reintroduction and establishment - aesthetic and dynamic
Jackson, Loupine and Hillyard (1995)	– ecological restoration: process of repairing damage caused by humans to the diversity and dynamics of indigenous ecosystems	- humans as damaging factor - no discussion of desired characteristics post-restoration

Table 3.1: Various source and definitions explored through a literary synthesis of definitions of the term restoration. Notable characteristics have been derived from the presented definitions. **(Continued)**

Table 3.1: Varying definitions of *restoration* and notable characteristics.		
Source	**Definition**	**Notable Characteristics**
National Research Council (1992) in Pastorok *et al*. (1997)	– restoration: returns ecosystem to a close approximation of its condition before it was disturbed – rehabilitation: improves a system to a 'good working order' – management: manipulates a system to ensure maintenance of one or a few functions	- overlap of concepts as continuum - collectively termed *restoration* - lack of separation
Field (1998)	– act of bringing an ecosystem back to its original condition	- restore to original state - no indication of source of degradation - no discussion of desired characteristics post-restoration
van Digglen, Grootjans and Harris (2001)	– reconstruction of a prior ecosystem	- representative of "true" restoration only - option not viable without first attempting reclamation and/or rehabilitation
Society for Ecological Restoration (SER) Primer (2004)	– process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed	- no indication of source of degradation - characterizes post-restoration state - lack of aesthetics

Table 3.1: Various source and definitions explored through a literary synthesis of definitions of the term restoration. Notable characteristics have been derived from the presented definitions. **(Continued)**

Table 3.1: Varying definitions of *restoration* and notable characteristics.		
Source	**Definition**	**Notable Characteristics**
Davis and Slobdokin (2004)	– process of restoring one or more valued processes or attributes of a landscape	- too simplified - valued characteristics not specifically defined

Table 3.1: Various source and definitions explored through a literary synthesis of definitions of the term restoration. Notable characteristics have been derived from the presented definitions.

As a result of the literary synthesis regarding ecological restoration, a variety of definitions and notable characteristics presented within those definitions has created a web of understanding about the term. While some notable characteristics are repeated between definitions, others are separate views completely. In order to understand the connections between the presented definitions, a visual overlap representing similar notable characteristics the definitions is depicted in Figure 3.1.

Figure 3.1: Overlap visualization of explored *restoration* definitions

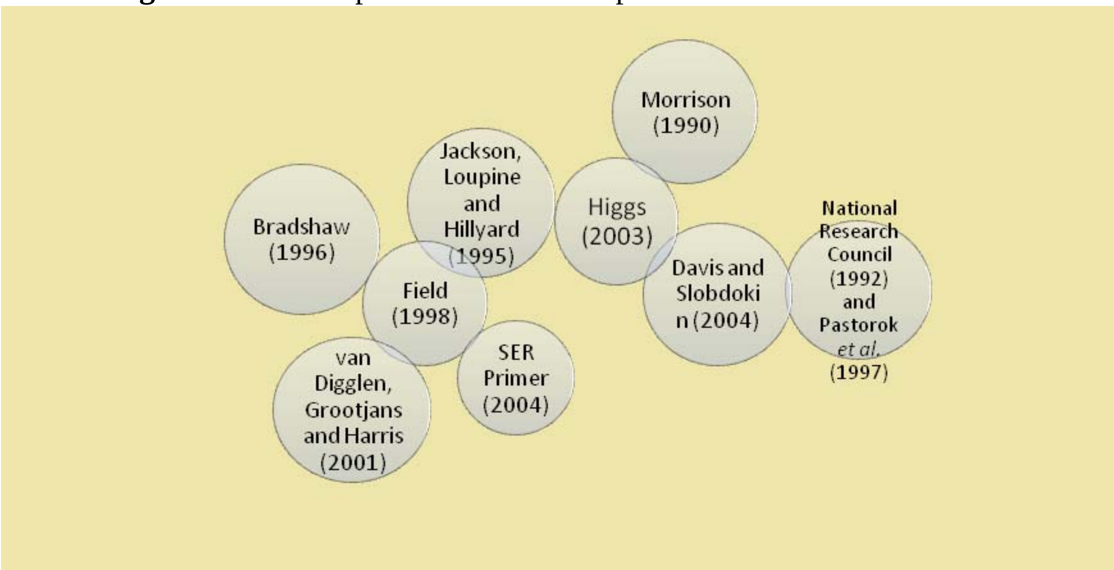

Figure 3.1: Overlap visualization of explored *restoration* definitions derived from synthesis of information presented in Table 3.1.

Figure 3.1 depicts the overlapping notable characteristics of each of the restoration definitions reviewed. As previously mentioned, Bradshaw (1996), Field (1998), and van Diggelen, Grootjans and Harris's (2001) definitions are similar yet distinctly different, resulting in their concepts not truly overlapping. Jackson, Loupine and Hillyard (1995) define ecological restoration as a process of repairing human-inflicted damage to indigenous ecosystems—a concept which overlaps with Higgs in relation to understanding historical processes which have led to the current state, as well as with Field in the lack of discussion surrounding the desired characteristics of post-restoration. However, Field still fails to mention the source of degradation that Jackson, Loupine and Hillyard suggest is caused by humans. Higgs leaves the historical implications open to further interpretation. The Society for Ecological Restoration (SER) also fails to mention the source of degradation, thus the overlap between the SER Primer and Field.

The remaining three definitions are more outliers than the rest. Morrison (1990) suggests the resulting vegetation should demonstrate aesthetic and dynamic characteristics of the natural communities on which they are based. Higgs notes the importance of restoring certain environmental processes similar to those mentioned by Morrison yet no other explored definition requires aesthetics as a goal. The National Research Council (1992), as noted in Pastorok *et al*. (1997), and Davis and Slobdokin (2004) are similar in that both definitions are too simplified. The National Research Counsil provides definitions for the terms *restoration*, *rehabilitation*, and *management* in relation to ecological restoration, yet Pastorok *et al.* collectively refers to the continuum of all three terms as *restoration*. While valued processes are lightly discussed, seemingly similar to Higgs, Davis and Slodbokin's definition is remains too simplified as they suggest that restoration is the process of restoring one or more valued processes or attributes of a landscape without specifying what the valued characteristics might encompass, leaving room for interpretation.

As depicted, none of the discussed definitions clearly encompass all notable characteristics. Thus, a synthesized definition of ecological restoration should include a majority of these characteristics in order to prevent manipulation of the overall project goals. As a result, ***ecological restoration*** should be defined as:

> **The act of restoring an ecosystem, striving to reach the original state of that natural area or a healthy, sustainably viable state, given that total retraction to the original is unattainable based on the level of human or natural degradation already observed, while also upholding an aesthetic and dynamic value based on the historical natural community structure of the area.**

This definition acknowledges (1) the desired end state of the ecosystem, (2) the cause of degradation as either human or natural, as well as (3) noting the magnitude of degradation as variable, and the desire to experience (4) an aesthetic and (5) dynamic value of the natural area.

3.3 Defining Ecotourism

3.3.1 *Working with the Past*

Since the first introduction of e*cotourism* as stem of general tourism practice, a variety of definitions have been formed in attempt to understand the relationship between general tourism ideologies and the natural environment, and the visitor's role in that relationship. As a result, the definition of ecotourism has evolved with each subsequent definition as researchers try to encompass the true understanding of what the practice is and its corresponding goals. In order to develop a derived definition which incorporates updated activity goals, past definitions must first be examined and discussed.

Similar to the discussion surrounding defining ecological restoration, the literature discusses many different definitions and understandings of the term *ecotourism*. Consequently, there is a lack of clarity regarding the difference between ecotourism and the practices of the general tourism industry. *Tourism* in itself is defined as "the temporary movement of people to destinations outside their normal home and workplace, the activities undertaken during the stay and the facilities created to cater for their needs."[26] As an extension of general tourism practices, Harrison (1997) argues:

> …ecotourism has become something of a buzzword in the tourism industry. To put the matter crudely, but not unfairly, promoters of tourism have tended to label any nature-oriented tourism product an example of 'ecotourism' while academics have so busied themselves in trying to define it that they have produced dozens of definitions and nothing else.[27]

The term *ecotourism* has generally been observed as the relationship between "tourism development and environmental conservation."[28] However, given "[international]

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[26] D. Newsome, S.A. Moore, and R.K. Dowling, *Natural Area Tourism: Ecology Impacts and Management* (Bristol, UK: Channel View Publications, 2001), 6.
[27] Harrison (1997) in Newsome, Moore and Dowling, *Natural Area Tourism*, 14.
[28] J. Higham and M. Lück, "Urban Economics: A Contradiction in Terms?" *Journal of Ecotourism* 1, no. 1 (2002): 36.

examples of rapid development, proliferation and diversification of ecotourism operations," there is speculation that "ecotourism may be the leading edge of mass tourism rather than an alternative to it.[29] It is this speculation which leads to the need for formulating a synthesized definition of ecotourism. The definition can in turn be used to determine current and future practices as being in compliance, or non-compliance, with a distinguished set of project guidelines.

Ceballos-Lascurian presents one of the first definitions of ecotourism stating:

> [Ecotourism is] tourism that involves travelling to relatively undisturbed or uncontaminated natural areas with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) found in these areas.[30]

This 1987 definition focuses on the visitation of undisturbed natural areas with the intent to study or admire the natural surroundings in that area. The ideas presented in this early definition seem to err on the broad spectrum as technology and tourist attitudes regarding the environment to which they travel are in constant flux.

The International Ecotourism Society defines ecotourism as "travel to natural areas the conserves the environment and sustains the well-being of local people."[31] Similarly, Lindberg and Hawkins (1993) define ecotourism as "travel to natural areas that conserves the welfare of local peoples."[32] Newsome, Moore and Dowling build upon these broad definitions suggesting five key principles fundamental to ecotourism: "…ecotourism is nature based, ecologically sustainable, environmentally educative, locally beneficial and generates tourist satisfaction."[33] However, the extent to which each key principle is to be observed is still in question. Furthermore, Newsome, Moore and Dowling note that "Cater (1994) argues that ecotourism, with its connotations of sound environmental management and consequent maintenance of environmental capital, should, in theory, provide a viable economic alternative to exploitation of the

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[29] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 36.
[30] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 37. and M.B. Orams, "Toward a More Desirable Form of Ecotourism," *Tourism Management* 16, no. 1 (1995): 4.
[31] A. Kiss, "Is Community-Based Ecotourism a Good Use of Biodiversity Conservation Funds?" *Trends in Ecology and Evolution* 19, no. 5 (2004): 232.
[32] Gutiérrez, "Case Study 16.1," 601.
[33] Newsome, Moore and Dowling, *Natural Areas Tourism*, 15.

environment."[34] Ecotourism must comply with at least two aspects of its root terms. First, ecotourism must serve as an economically viable practice. Second, ecotourism must benefit the environment to the same, if not higher degree as its economic goals.

Higham and Lück explore two extremes of this definition process: 1. *all* tourism can be 'ecotourism' and 2. *no* tourism can be considered ecotourism.[35] The diversity of these extremes are portrayed as a continuum as derived from Miller and Kaae (1993) (Figure 3.2).[36] On one side of the debate, all tourism can be considered ecotourism as "humans are viewed as living organisms whose behavior is natural and who have no obligation or responsibilities to consider other living things, [thus creating] no difference between the 'natural environment' and the 'human made environment'."[37] In contrast, the opposing debate considers the idea that ecotourism is impossible as any kind of tourism will inevitably have a negative impact on the natural environment.

Figure 3.2: Continuum of Ecotourism Paradigms

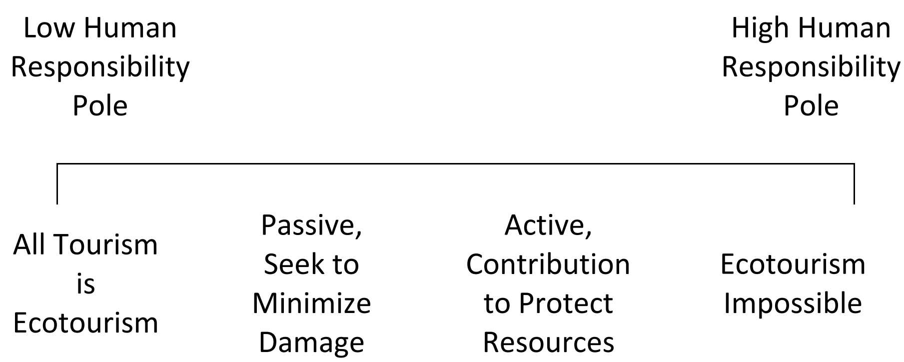

Figure 3.2: Continuum of ecotourism paradigms mapping human responsibility levels associated with conceptual ecotourism levels. Presented by Orams (1995) as derived from Miller and Kaae (1993).[38]

The first extreme in this continuum, *all* tourism can be 'ecotourism,' denotes a passive approach in conceptualizing human responsibility to the natural environment. This viewpoint can be explored in relation to Ballantine and Eagles (2004) survey of

[34] Newsome, Moore and Dowling, *Natural Areas Tourism*, 17.
[35] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 38-39.
[36] Orams, "Toward a More Desirable Form of Ecotourism," 4.
[37] Orams, "Toward a More Desirable Form of Ecotourism." 4.
[38] Orams, "Towards a More Desirable Form of Ecotourism," 4.

Canadian tourists choosing a trip to Kenya. In answering survey questions, tourists are able to convey their own intentions during vacation planning. The survey questions presented to the tourists consisted of the following:

1. The respondent must answer 'very important' or 'somewhat important' to 'learning about nature' as a motivation when planning a trip to Kenya.
2. The respondent must answer 'very important' or 'somewhat important' to 'wilderness/undisturbed areas' as an attraction when choosing a trip to Kenya.
3. The respondent must spend at least one-third of their Kenyan vacation days on safari.[39]

Tourist answers, in turn, correlate with Ballantine and Eagles' understanding of ecotourist dimensions including "the social motive (educational component); the desire to visit 'wilderness/undisturbed areas'; and a temporal commitment."[40] According to these questions, Higham and Lück suggest the guidelines for what might constitute an eco-tourist are too broad. The survey results suggest 84% of visitors would be considered ecotourists.[41] A restrictive definition of ecotourism must be established in order to ultimately preserve the visited areas while still catering to the public desire to visit, study or explore those areas.

Butler (1992) presented the opposite extreme of the defining process, *no* tourism can be considered ecotourism, to the IVth World Congress on National Parks and Protected Areas highlighting the principles and characteristics of ecotourism (Table 3.2).[42] These principles and characteristics are highly critical in comparison to the survey administered by Ballantine and Eagles, creating a structuralized view of what constitutes a tourist as an ecotourist. However, such an extreme view can potentially lead to a disruption in 'ecotourist activities' all together, as Higham and Lück suggest, "such definitions [require] ecotourism operations to remain faithful to the ideals of ecotourism."[43] While a complete halt in ecotourist activities is a less than desirable

[39] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 38.
[40] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 38.
[41] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 38.
[42] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 38-39.
[43] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 38.

outcome, it is important to note that "since ecotourism impacts are often concentrated in ecologically sensitive areas… they must be controlled."[44]

Table 3.2: Principles and Characteristics of Ecotourism

1. It must be consistent with a positive environmental ethic, fostering preferred behavior.
2. It does not denigrate the resource. There is no erosion of resource integrity.
3. It concentrates on intrinsic rather than extrinsic values.
4. It is biocentric rather than homocentric in philosophy, in that an ecotourist accepts nature largely on its terms, rather than significantly transforming the environment for personal convenience.
5. Ecotourism must benefit the resource. The environment must experience a net benefit from the activity, although there are often spin-offs of social, economic, political or social benefits.
6. It is first-hand experience with the natural environment.
7. There is, in ecotourism, an expectation of gratification measured in appreciation and education, not in thrill-seeking or physical achievement. These latter elements are consistent with adventure tourism, the other division of natural environment (wildland) tourism.
8. There are high cognitive (informational) and effective (emotional) dimensions to the experience, requiring a high level of preparation from both leaders and participants.

Table 3.2: Principles and characteristics of ecotourism as presented in Butler (1992).[45]

In order for a working model to be accepted, a definition of ecotourism which strays from extremes must be formulated. Ultimately, if the definition represents too simplistic of a model any claim to ecotourism will be accepted, potentially creating an over-supply of ecotourism operations thus negating the differentiation between general tourism and the specialized practices in natural areas. Alternatively, if the definition becomes too rigid, demand for ecotourism operations will decrease as fewer tourists will be willing to participate in such activities. The proposed definition must take into account "robust and widely recognized industry standards (supply side) while also

[44] Hvenegaard (1994) in Newsome, Moore and Dowling, *Natural Area Tourism*, 19.
[45] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 39.

serving visitor interest in achieving the ecotourism experiences that they seek (demand side)."[46] Higham and Lück note:

> The viability of ecotourism operations clearly hinges on two fundamental requirements: (1) a resource base that demonstrates some degree of naturalness; and (2) the infrastructures that are fundamental to commercial tourism operations. [However], one cannot comfortably exist in the company of the other, yet both are required to facilitate a viable ecotourism operation.[47]

The idea that the two concepts are almost contradictory aids in the understanding that a unified definition is necessary in order to successfully implement and sustain an ecotourism operation. Both the tourist, participating in their own vacation activities, and the industry, catering to the tourists, have a responsibility to follow the attributes presented in the ecotourism definition if the activities are to be described as such. It is not enough for one side of the equation to conform their own actions if the other will simply counter that activity.

Orams suggests many proposed definitions of the term ecotourism will likely fall between the two extreme outlooks of the practice. Noting the fact that some definitions are rooted towards one spectrum or the other, Orams discusses a variety of proposed definitions. The Ceballos-Lascurian (1987) definition previously discussed is classified as a passive definition as the responsibility of the tourist to the natural environment is lacking.[48] Similar passive ideas of ecotourism include those suggested by:

> Zell (1992), who views ecotourism as tourism which is 'ecologically responsible', Muloin (1992), who sees ecotourism as 'tourism which is environmentally sensitive' and Figgis (1993), who states that ecotourism should avoid 'damage or deterioration of the environment'.[49]

The passive definitions of ecotourism do not account for a large amount of human responsibility. This approach leads to the question of whether people considered ecotourists by simply visiting an area or if they are obligated to take part in the on-going protection and preservation of the visited area.

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[46] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 37.
[47] Higham and Lück, "Urban Economics: A Contradiction in Terms?" 40.
[48] Orams, "Toward a More Desirable Form of Ecotourism," 4.
[49] Orams, "Toward a More Desirable Form of Ecotourism," 4.

Active definitions of ecotourism build on the passive models, incorporating tourist responsibility into a typical holiday vacation. Ziffer (1989) suggests:

> The ecotourist practices a non-consumptive use of wildlife and natural resources and contributes to the visited area through labour or financial means aimed at directly benefiting the conservation of the site.[50]

While Ziffer mentions the contributive responsibility of the ecotourist, perhaps it is notable to mention the option given with this stated definition. Yes, an increased responsibility falls on the visiting tourist, yet Ziffer provides flexibility by giving the option to contribute via financial means.

On a similar level, Valentine (1992) broadens Ziffer's perspective, proposing the following criteria to define ecotourism:

> [a] based upon relatively undisturbed natural areas,
>
> [b] non-damaging, non-degrading,
>
> [c] a direct contributor to the continued protection and management of the protected area used,
>
> [d] subject to an adequate and appropriate management regime.[51]

Valentine takes the passive definitions to the next step in the addition of part (c) as the tourists involved have a responsibility to uphold while vacationing. This addition gives participation in activities a new connotation as visitors must consciously become aware of their natural surroundings, rather than just passively partaking in typical holiday opportunities; however, it also strays from specifying a method of contribution, such as Ziffer's monetary suggestion. Thus, the differentiation must be made between whether an ecotourist can simply contribute financially and still be considered ecotourists, or if direct participation a more desirable outcome of the visits to natural areas.

As ecotourists, visitors should not only participate in acts which might potentially result in experiencing "nature in ways that lead to greater understanding, appreciation, and enjoyment."[52] Lee and Moscardo (1995) explore the changes in tourists' environmental awareness, attitudes and behavioral intentions between pre- and post-ecotourist based visits. A focus of study is based in the accommodation sector of the

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[50] Orams, "Toward a More Desirable Form of Ecotourism," 5.
[51] Orams, "Toward a More Desirable Form of Ecotourism," 5.
[52] W.H. Lee and G. Moscardo, "Understanding the Impact of Ecotourism Resort Experiences on Tourists' Environmental Attitudes and Behavioral Intentions," *Journal of Sustainable Tourism* 13, no. 6 (2005): 546.

tourist visits, noting that accommodations which take part in environmentally friendly or sustainable practices are likely to reinforce the visitors' environmental attitudes and overall experience. In order to determine the "effects of experiences in ecotourism accommodation on visitors' environmental attitudes and behavioural intentions,"[53] Lee and Moscardo used The Model of Responsible Environmental Behaviour (Figure 3; Hines *et al*. 1986-1987) in combination with The Theory of Planned Behaviour (Ajzen and Driver 1992) to derive "a simple framework for understanding responsible environmental behaviour" (Figure 3.3).[54]

Figure 3.3: The Model of Responsible Environmental Behaviour

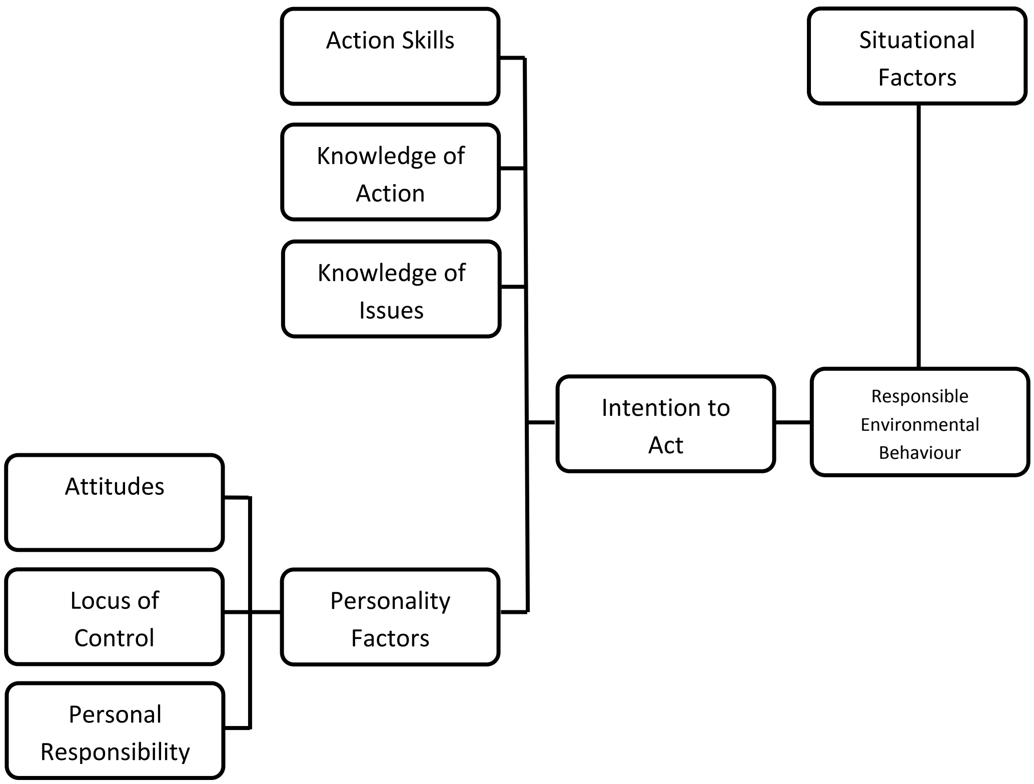

Figure 3.3: The Model of Responsible Environmental Behaviour as originally presented by Hines *et al.* (1986-1987).[55] Directionality is implied to move from all factors toward "Responsible Environmental Behaviour."

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[53] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 550.
[54] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 549-550.
[55] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 549.

The Model of Responsible Environmental Behaviour (Figure 3.3) breaks down the factors which are likely to aid in an individual's intention to take environmental action. Personality factors—including personal attitudes, locus of control or "an individual's perception of whether or not he or she has the ability to bring about change through his or her own behaviour,"[56] and personal responsibility—alone will not necessarily lead to the intention to act. Personality factors must be combined with action skills and knowledge of both action strategies and issues in order to progress to an intention to act. Only then will tourists have the opportunity to engage in responsible environmental behavior.

The model also suggests "situational factors, such as economic constraints, social pressures and opportunities to choose different actions, may either counteract or strengthen the variables of the model."[57] Given these constraints, the intention to act in combination with variable situational factors will potentially determine the magnitude of responsible environmental behavior observed.

Alternatively, Lee and Moscardo have derived a simple framework for understanding responsible environmental behavior (Figure 3.4) suggesting a different approach to assessing variables leading to the final behavior goals. In contrast to Hines *et al*. (1986-1987), Lee and Moscardo's simple framework suggests that it is specifically attitude traits which will have a profound influence on developing an intention to act in terms of responsible environmental behavior as "attitudes are seen as a precursor to intention rather than as personality characteristics."[58] The locus of control and personal responsibility factors do not weigh heavily in this behavioral analysis.

With the simplified model as a baseline approach to the study of ecotourist intentions, Lee and Moscardo developed pre- and post-visit questionnaires incorporating ideas similar to those in the previously discussed Ballantine and Eagles (2004) survey. Lee and Moscardo surveyed tourists':

[1] interest levels in participating in conservation initiatives,

[2] awareness levels of the conservation value of the island visited,

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[56] Hines *et al*. in Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 548.
[57] Hines *et al*. 1986-1987 in Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 549.
[58] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 550.

[3] beliefs regarding negative environmental impacts of different behaviors, and

[4] preference levels for more eco-friendly tour and accommodation options for future travel.[59]

Figure 3.4: Simple Framework for Understanding Environmental Behaviour

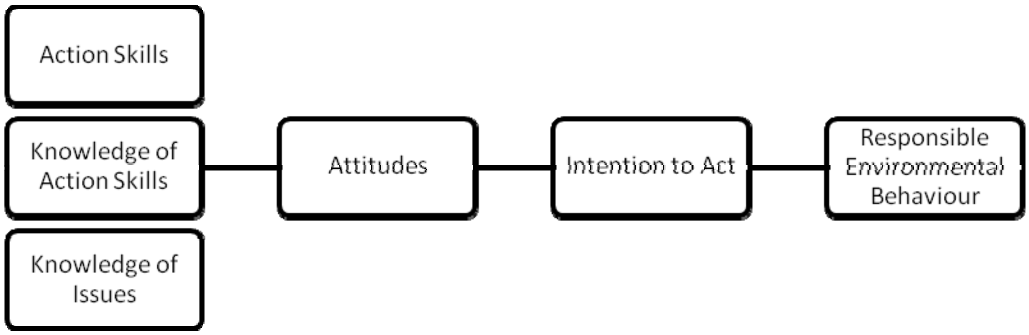

Figure 3.4: A simple framework for understanding responsible environmental behaviour derived from Hines *et al*. (1986-1987) The Model of Responsible Environmental Behaviour and Azjen and Driver's (1992) Theory of Planned Behaviour.[60] Similar to the Hines *et al*. model presented in Figure 3.3, directionality is implied to move from all factors toward "Responsible Environmental Behavior."

According to the Lee and Moscardo survey results, despite high levels of concern, "respondents in both the pre-visit and post-visit samples believed that their holiday behavior had very little impact on the environment."[61] However, further analysis suggests a preference to do business with environmentally responsible tour operators and accommodation, as well as a willingness to pay for more environmentally sensitive accommodation.[62] This disconnect between tourists' current personal impact assessments and future holiday intentions indicates a passive stance in ecotourist action, signifying such a simplified framework of responsible environmental behavior is not viable as an analysis of ecotourism.

Instead, it is more plausible to account for a locus of control and personal responsibility in combination with attitudes as personality factors, which in turn influence intention to act, as Hines *et al*. (1986-1987) proposes in the Model of Responsible

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[59] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 552.
[60] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 550.
[61] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 553-554.
[62] Lee and Moscardo, "Understanding the Impact of Ecotourism Resort Experiences," 554.

Environmental Behaviour (Figure 3.3). By simplifying the model, Lee and Moscardo leave out the possibility of future ecotourist intention as current attitudes may not account for a personal perception of the ability to bring about change (locus of control), or even the desire to do so (personal responsibility).

Alternatively, Gutiérrez (2006) makes note of four principles of ecotourism which distinguish the term from the more generalized notion of sustainable tourism. While sustainable tourism may originate from any general tourism practices by simply participating in small practices such as reuse of towels or linens at a chosen accommodation spot, Gutiérrez indicates that ecotourism:

> [1] contributes actively to the conservation of natural and cultural heritage,
>
> [2] includes local and indigenous communities in its planning, development, and operation, contributing to their well-being,
>
> [3] interprets the natural and cultural heritage of the destination to visitor(s), [and]
>
> [4] lends itself better to independent travelers, as well as organized tours for small groups.[63]

In the establishment of these principles, Gutiérrez notes the importance of an active approach to ecotourist participation, suggesting that a more passive approach would be more characteristic of sustainable tourism.

3.3.2 *Understanding Ecotourism: A Synthesized Definition*

In order to stray from characteristics general to other tourism operations, discussed definitions of ecotourism and ecotourist practices are presented in conjunction with notable characteristics of each definition (Table 3.3). Definitions have been presented in the order in which each had been previously discussed. These definitions represent a compilation of both passive and active approaches to participation in ecotourism, as each variation requires consideration within this discussion. The notable characteristics listed in coordination with each definition have been derived directly from the definition presented or from discussion related to that definition. While some notable characteristics of the definitions overlap with one another, a definition incorporating all notable characteristics is lacking.

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[63] Gutiérrez, "Case Study 16.1," 601.

Table 3.3: Varying definitions of *ecotourism* and notable characteristics.		
Source	**Definition**	**Notable Characteristics**
Ceballos-Lascurian (1987)	– tourism that involves travelling to relatively undisturbed natural areas – specific object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) found in these areas	- relatively undisturbed natural areas - study, admire nature and culture of area
International Ecotourism Society in Kiss (2004)	– travel to natural areas that conserves the environment and sustains the well-being of local people	- environmental conservation - locally sustainable
Newsome, Moore and Dowling (2001)	– five key principles fundamental to ecotourism	- nature based - ecologically sustainable - environmentally educative - locally beneficial - tourist satisfaction
Cater (1994)	– provide a viable economic alternative to exploitation of the environment	- viably economic
Orams (1995) as derived from Miller and Kaae (1993)	– continuum of ecotourism paradigms – human responsibility pole	- all tourism is ecotourism - no tourism is ecotourism - active vs. passive
Ballantine and Eagles (2004)	– ecotourist dimensions: social motive, desire to visit 'wilderness/undisturbed areas', temporal commitment	- educational component - nature based - active time commitment

Table 3.3: Various source and definitions explored through a literary synthesis of definitions of the term ecotourism. Notable characteristics have been derived from the presented definitions.

Table 3.3: Varying definitions of *ecotourism* and notable characteristics.		
Source	**Definition**	**Notable Characteristics**
Butler (1992)	– presentation of principles and characteristics of ecotourism (Table 3.2)	- positive environmental ethic - no resource degradation - intrinsic, biocentric - beneficial to resource, nature based - appreciation, education factors: emotional and informational
Higham and Lück (2002)	– two fundamental requirements of ecotourism operations: - resource base that demonstrates some degree of naturalness - infrastructures that are fundamental to commercial tourism – requirements cannot comfortably exit simultaneously	- nature based - viably economic
Zell (1992)	– tourism which is ecologically responsible	- nature based - responsibility factor
Muloin (1992)	– tourism which is environmentally sensitive	- nature based - sensitive to area
Figgis (1993)	– should avoid damage to or deterioration of the environment	- nature based - avoidance of degradation

Table 3.3: Various source and definitions explored through a literary synthesis of definitions of the term ecotourism. Notable characteristics have been derived from the presented definitions. **(Continued)**

Table 3.3: Varying definitions of *ecotourism* and notable characteristics.		
Source	**Definition**	**Notable Characteristics**
Ziffer (1989)	– ecotourist practices a non-consumptive use of wildlife and natural resources and contributes to the visited area through labour or financial means aimed at directly benefitting the conservation of the site	- non-consumptive - time/active contribution - monetary contribution - directly beneficial
Valentine (1992)	– based upon relatively undisturbed natural areas – non-damaging, non-degrading – a direct contributor to the continued protection and management of the protected area – subject to an adequate and appropriate management regime	- nature based - no resource degradation - directly beneficial - subject to management
EAA & ATON Nature and Ecotourism Accreditation Program (2000)	– ecologically sustainable tourism with a primary focus on experiencing natural areas that foster environmental and cultural understanding , appreciation and conservation	- ecologically sustainable - nature based - environmentally educative - appreciate nature, culture of area
Lee and Moscardo (2005)	– simple framework for understanding responsible environmental behaviour (Figure 2) as derived from Hines *et al*. (1986-1987) The Model of Responsible Environmental Behaviour (Figure 1) and Azjen and Driver's (1992) Theory of Planned Behaviour.	- attitude traits have influence on development of intention to act with responsible environmental behavior

Table 3.3: Various source and definitions explored through a literary synthesis of definitions of the term ecotourism. Notable characteristics have been derived from the presented definitions. **(Continued)**

Table 3.3: Varying definitions of *ecotourism* and notable characteristics.		
Source	**Definition**	**Notable Characteristics**
Gutiérrez (2006)	– four principles distinguishing ecotourism from sustainable tourism	- natural and cultural heritage conservation - local and indigenous community involvement, locally beneficial - natural and cultural heritage education - caters to individual and small group travelers

Table 3.3: Various source and definitions explored through a literary synthesis of definitions of the term ecotourism. Notable characteristics have been derived from the presented definitions.

Similar to the discussion of restoration, a number of notable characteristics of each ecotourism definition overlap with those of other definitions discussed, however, none of the discussed definitions clearly encompasses all notable characteristics. In order to understand the connections between the presented definitions, a visual overlap representing similar notable characteristics the definitions is presented in Figure 3.5.

As depicted, the most prominent overlapping characteristics in defining ecotourism include:

1) the idea that activity must be nature based,
2) viably economic and locally beneficial, as well as
3) educational, and
4) culturally conservative.

Many of the explored definitions incorporated some but not all of the characteristics while others overlapped considerably in one area as opposed to others. The colors presented in the figure correspond between each individual characteristic representation. Matching circles represent the same researchers. Dark blue circles are definitions not repeated when exploring the characteristics.

Figure 3.5: Overlap visualization of explored *ecotourism* definitions

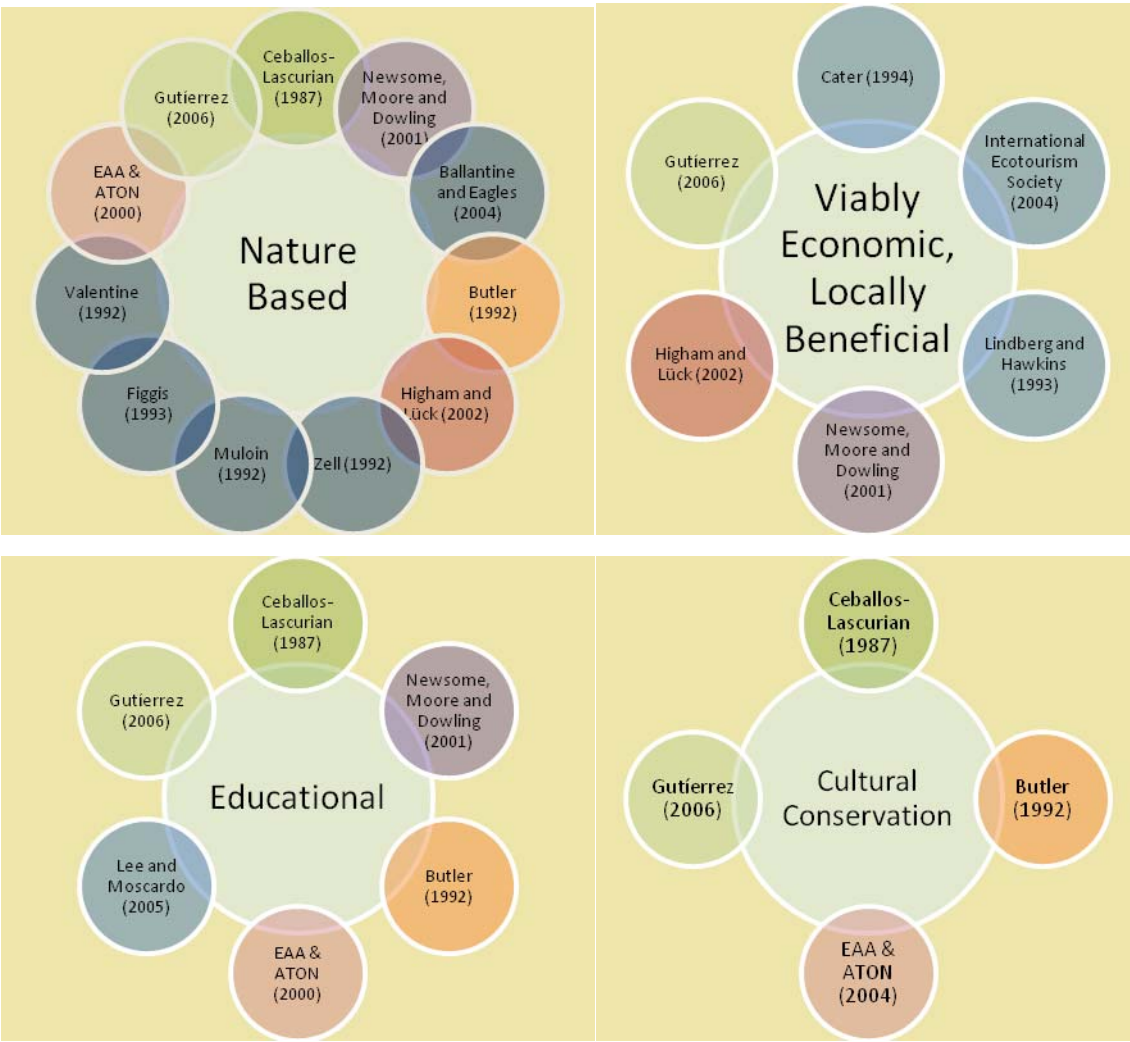

Figure 3.5: Overlap visualization of explored *ecotourism* definitions derived from synthesis of information presented in Table 3.3.

Given this breakdown, Gutiérrez (2006) represents the only explored definition which attempts to encompass all of the notable characteristics through discussion of four principles which serve to distinguish ecotourism from sustainable tourism. Still, a stand-alone definition of ecotourism is not presented as Gutiérrez states what ecotourism is only relative to what it is not (sustainable tourism). Alternatively, Ceballos-Lascurian (1987), Butler (1992), and EAA & ATON (2002) overlap on three of the four noted characteristics, yet all fail to denote the importance of the practice as viably economic and locally beneficial. Similarly, Newsome, Moore and Dowling (2001) also overlap on three of the four noted characteristics, yet, while including the importance of being viably economic and locally beneficial, fail to incorporate cultural conservation into the definition.

Thus, a synthesized definition of ecotoursim should include a majority of these characteristics in order to prevent manipulation of the overall project goals. As a result, ***ecotourism*** should be defined as:

> **Ecologically sustainable tourism that involves an active effort to increase the environmental responsibility and education levels of visitors through physical commitment to natural area conservation and restoration efforts, while still maintaining an economically viable situation for the local culture and peoples in that area.**

This definition acknowledges (1) the tourism involved must be ecologically sustainable, (2) tourists must actively participate in conservation efforts, with (3) the potential to increase personal environmental responsibility and education levels, and (4) the operation must also be an economically viable situation for the local culture and population.

3.4 Understanding Local Economic Benefits of Ecotourism

Since the concept of ecotourism still holds root in general tourism practices, generated income and profit from the activity are still expected. However, as stated in the derived definition, the income and profit generated from ecotourism operations must aid the local culture and population. In order to realize the full potential for ecotourism to serve as an ecological restoration tool, the importance of these local economic benefits need to be examined and understood.

Ecotourism in relation to the local population has been widely questioned in terms of economic benefit. Lindberg, Enriquez and Sproule (1996) developed a case study from Belize in which they focused on three ecotourism objectives: "generation of financial support for protected area management, generation of local economic benefits and generation of local support for conservation."[64] Through a quantitative analysis of the financial impact on protected areas, the economic impact on local communities and the effect on local resident conservation attitudes, Lindberg, Enriquez and Sproule suggest that while they found that tourism at the studied sites in Belize did not result in a

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[64] K. Lindberg, J. Enriquez, and K. Sproule, "Ecotourism Questioned: Case Studies from Belize," *Annals of Tourism Research* 23, no. 3 (1996): 543.

positive net financial impact at the time of study, "the implementation of even modest fees would result in tourism achieving this objective." Alternatively, the sites were able to generate some economic benefit as well as increase local support for continued conservation practice. [65]

While the specific practices mentioned in Lindberg, Enriquez and Sproule (1996) were mentioned to have been questioned[66] of being true ecotourism practices, the overall findings of the case study provide evidence that the operations hold constant to all the goals presented in the derived ecotourism definition, even if only to a small degree. Ultimately, evidence of increased economic benefit leading to heightened environmental awareness lends further support for the importance of local economic benefit resulting from ecotourism practices. In a 2000 published *Ecological Economics* study, Wunder conducts a different case study with similar findings regarding the link between local economic benefit and conservation efforts.

Wunder analyzes the importance of Cater's (1994) final ecotourism criteria requiring "notable economic participation [in ecotourism] by local residents [which] aims both at an equal distribution of tourism incomes and at a maximization of local development potentials by reducing import leakages."[67] Wunder expands on this criteria suggesting:

> …high local income should also increase conservation incentives, *inter alia*, because local resource managers have the most direct bearing on the environment, whereas tourism agencies are geographically more mobile: they may more easily 'move-on' from a degraded site to a pristine area. Local tourism income is thus both a goal in itself, and an instrument for conservation.[68]

This expansion is explored through examining activity in five remote villages within the Cuyabeno Wildlife Reserve located in Ecuador's Northern Amazon region. The study focused on two hypotheses "regarding the link between tourism participation models and

[65] Lindberg, Enriquez and Sproule, "Ecotourism Questioned," 559.
[66] Authors note two studies, Cater (1992) and Wheat (1994), which "question whether tourism in Belize meets the standards of either ecotourism or sustainable tourism." p559
[67] S. Wunder, "Ecotourism and Economic Incentives—an Empirical Approach," *Ecological Economics* 32 (2000): 466.
[68] Wunder, "Ecotourism and Economic Incentives," 466.

local income (hypothesis 1) and between income incentives and conservation (hypothesis 2)."[69]

As a result, Wunder concluded that in the Cuyabeno region, ecotourism provided local residents with benefits which could supplement or replace alternative sources of income.[70] This result holds consistent with the last goal presented in the derived definition of *ecotourism* as the operation must be economically viable to the local culture and population. However, Wunder further concludes that this increase income provides a supplementary environmental benefit. Wunder concludes:

> (1) in villages specialised in tourism, income flows raised environmental awareness and gave incentive for a new rationality in traditional resource use;
>
> (2) tourism income is less likely to reversenon-traditional, degrading development patterns in advanced stages; [and]
>
> (3) tourism income can help to unite actors and strengthen the *raison d'être* of a protected area threatened by competing land uses.[71]

In the case of Cuyabeno, economic income did not only provide monetary benefit to the local area, it also increased the derived environmental benefit to the local area. The local population has become more apt to preserve their natural surroundings as future use will only further benefit the population in the long run.

He *et al*. focus on a variable approach in examining the result of economic benefits derived from ecotourism activity. Examining the Wolong Nature Reserve for Giant Pandas in China, He *et al*. notes the important presence of stakeholders in connection with a number of ecotourism operations as not all operations are solely started and managed locally. While local residents make up a portion of the ecotourism stakeholders, the more prominent and influential stakeholders may be other local or non-local entities which "bear different levels of costs of conservation and likely expect relevant levels of benefits from ecotourism development."[72] As a result, He *et al*. examined economic benefit distribution among stakeholders of the Wolong Nature Reserve.

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[69] Wunder, "Ecotourism and Economic Incentives," 476.
[70] Wunder, "Ecotourism and Economic Incentives," 476.
[71] Wunder, "Ecotourism and Economic Incentives," 477.
[72] G. He, X. Chen, W. Liu, S. Bearer, S. Zhou, L.Y. Cheng, H. Zhang, Z. Ouyang, and J. Liu, "Distribution of Economic Benefits from Ecotourism: A Case Study of Wolong Nature Reserve for Giant Pandas in China," *Environmental Management* 42 (2008): 1018.

Overall, He *et al*. found an inequality of economic benefits distributed between stakeholders. Since a number of hotel and souvenir shops surround the Reserve area, much of the economic benefit is directly absorbed by those operations without being filtered back into the local community. Additionally, much of the construction of new infrastructure was contracted to non-local sources despite local residents having the skills necessary to take part in the available job opportunities.[73] Similarly, the local residents, a majority of which were farmers, who were willing to participate in converting to a new employment sector often did not have the education or extra funds to do so. He *et al*. suggests, "The reserve government could also provide vocational training programs in hospitality, entertainment, tourism, and other relevant businesses, resulting in a trained labor force that could be more competitive for ecotourism jobs."[74] Provided adequate training, local residents have the potential to increase personal and collective economic benefit derived from local ecotourism operation.

However, in addition He *et al*. further suggests that rural households be relocated closer to main roads, and consequently ecotourism facilities, which will provide two main incentives. First, better access to ecotourism facilities will result in access to economically beneficial activities, including the opportunity to convert houses into hotels or restaurants, starting souvenir shops, and easier access to transport goods and services making it more convenient to sell agricultural products. Second, the relocation from rural areas will benefit conservation efforts in local area. He *et al*. state:

> …households far from the main road and closer to the panda habitat receive less benefit from ecotourism and must subsist by using forest products, possibly harming the habitat… By relocating closer to the main road, usually where elevation is lower and temperature is higher, households might need less fuelwood for heating in winters. With more income from ecotourism, those households might consumer more electricity and extract less fuelwood. Collectively, relocated households could greatly reduce their impact on panda habitat.[75]

In regard to this portion of the case study, an economic benefit of ecotourism is proposed as an incentive to alter local living arrangements through relocation. While relocation to

[73] He *et al*. "Distribution of Economic Benefits from Ecotourism," 1022-1023.
[74] He *et al*. "Distribution of Economic Benefits from Ecotourism," 1023-1024.
[75] He *et al.* ""Distribution of Economic Benefits from Ecotourism," 1024.

lower land areas is not required, the economic incentives can ultimately aid in conservation efforts providing less strain on the surrounding natural habitat.

These studies provide examples of how ecotourism can benefit the local economy of the area. Although the particular study sites discussed represent economically developing areas, application of local economic benefit to developed areas should not be dismissed. Regardless of initial economic standing, ecotourism operations provide an opportunity for local economic benefit which can, in turn, result in a tangible incentive for increased conservation and restoration efforts.

3.5 The Function of Ecotourism as an Ecological Restoration Tool

Through synthesizing clear definitions of the terms ecological restoration and ecotourism, decisions regarding utilization of the concepts can now be explored. Ecological restoration aims to restore an environment to a non-disturbed condition yet, when that area has been disturbed to the point that it can no longer be restored to an original state, a healthy and sustainably viable dynamic will need to be accepted as a restored state. With this, ecological restoration takes historical processes into consideration when implementing a proposed project. Similarly, ecotourism aims to maintain an ecologically sustainable state in conjunction with visitor commitment to and education of the natural area. Although ecotourism does also maintain that the operation result in an economically beneficial component, the benefit should be to the local people and culture of that area. Given this mindset, and assuming the local people and culture strive to work to embrace the natural area which surrounds them, ecotourism has the potential to operate as an ecological restoration tool.

In a 2002 community-based ecotourism study, Hunter explores ecotourism-conservation coordination opportunities stating:

> Ecotourism is a potential source for the financing of conservation. Mechanisms to capture revenue include: user fees, concessions, sales and royalties, taxation, and donations. Ecotourism can support conservation by building a constituency from the visitor and local populations to

> maintain and protect an area. It can also be impetus for private conservation efforts.[76]

Although Hunter focuses on ecotourism in conjunction with conservation efforts, the same financing incentives can be applied to restoration efforts. Restoration goals proposed in areas with low financial means will be able to viably sustain their own livelihoods, culture, and natural surroundings with the understanding that ecotourism can be used as a restoration tool rather than a purely economic operation. However, the use of ecotourism should not be confined to low income areas. As a way to increase visitor education and responsibility levels, ecotourism has the potential to reach a wide variety of travelers if consistently monitored and priority levels of the operation remain intact.

Orams (1995) notes the importance of the progress measurement of ecotourist activity and its objectives. Since ecotourism relies on the cooperation between maximizing tourist satisfaction and maximizing environmental benefit, Orams suggests the use of outcome indicators to assess the success of an ecotourism operation. The first objective of the outcome indicators focuses on the tourist, measuring levels of [1] satisfaction and enjoyment, [2] education—learning, [3] attitude—belief change, and [4] behavior—lifestyle change.[77] With methodology involving information-gathering questionnaires and interviews during- and post-visit, Orams makes use of these indicator levels to determine whether or not a transition is occurring between tourist enjoyment and their behaviors, suggesting an active attitude is necessary when taking part in ecotourist operations.

The second objective of Orams' outcome indicators focuses on the "direct and indirect, short- and long-term effects of tourist use on the natural environment,"[78] measuring levels of [1] minimal disturbance, [2] improvement – habitat protection, and [3] long term health and viability. Orams proposes an adaptable framework in order to determine the levels in which environmental indicators have changed:

> [First,] for each setting, decisions should be made on what types and levels of change in the natural ecosystem are acceptable. Second, what critical

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[76] J.O. Hunter, "Bolivia Community-Based Ecotourism Development" (MES Thesis, The Evergreen State College, 2002), 22.
[77] Orams, "Towards a More Desirable Form of Ecotourism," 7.
[78] Orams, "Towards a More Desirable Form of Ecotourism," 6.

> indicators should be used to monitor this change should be determined and, third, what human actions are appropriate and inappropriate for that setting need to be decided.[79]

This simplified framework can be seen as a common sense factor, yet it is important to note that each step is important in setting up a measurement strategy for a project as each project will be measurably different than the next, regardless of any proposed similarity. However, in order to minimize the variation of baseline decision-making in regard to restoration projects, a more complete or precise framework is essential.

Pastorok *et al.* (1997) notes that "restoration planning starts with the definitions of existing problems, a clear statement of project objectives, and an understanding of uncertainty."[80] With this base-line mentality, Pastorok *et al*. proposes a series of primary steps in the ecological planning process:

1. Define habitat of concern and existing problem(s) with quantitative statements about physical, chemical, and biological conditions.
2. Develop goals and objectives for restoration, including the time period over which these should be met.
3. Develop a conceptual model of the ecosystem to be restored.
4. Develop restoration hypothesis regarding responses to specific habitat manipulations or transplant efforts.
5. Use the conceptual model to identify key ecological parameters to be manipulated or monitored and to refine performance criteria.
6. Evaluate and refine restoration hypotheses using ecological models or reference site information. Use prior experience to evaluate whether the proposed manipulations will support desired functions at sufficient levels or over the desired time period.
7. Develop restoration design.
8. Perform feasibility, cost, and impact analysis.
9. Develop final restoration design and implementation plan.
10. Implement project.
11. Perform monitoring and adaptive management including, but not limited to, maintenance.[81]

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[79] Orams, "Towards a More Desirable Form of Ecotourism," 7.
[80] Pastorok *et al*. "An Ecological Decision Framework," 92.
[81] Pastorok *et al*. "An Ecological Decision Framework," 92.

While Pastorok *et al*. does not specifically discuss ecotourism as one of the tools potentially useful in the restoration process, the framework proposed leaves enough room for the adaptation of restoration methods to include viable ecotourist operations as a tool.

Similarly, Cuevas and van Leersum (2001) put forth a project framework to include research in the areas of socioeconomic matters, natural resource management, and research and conservation. Their project focuses on the connection between humans and their surrounding environment on the Juan Fernandez Islands, Chile, where the local population is highly dependent on island resources. The interdisciplinary approach to restoration and conservation of the islands is aided by a variety of technical processes, including the use of ecotourism as a tool. As a starting point for their project, Cuevas and Van Leersum note the efforts associated with implementing a viable ecotourism program. Guided ecotourism is a hopeful launch point for the Islands as it is likely to "generate income among the islanders and safeguard the existing flora."[82] In order to successfully implement a working program, island residents who desired to obtain jobs as park guides took part in relevant educational courses including those relating to history of the islands and natural resources, English and communication, risk prevention, first aid and mountain climbing. Similarly, the project provided an Environmental Information and Education Centre for residents and island visitors while also training restaurant and guesthouse owners in useful hospitality techniques.[83] While the processes taken into consideration regarding ecotourist activity are consistent with those presented in the collective definition of ecotourism, the project discussion of restoration does not provide a clear determination as to what state the natural areas will be "restored," or to what extent the project success is to be monitored or maintained.

Focusing on coral reefs and their management in Tanzania, Wagner (2004) recognizes the obstacles facing viable ongoing management in a resource-limited population. Human degradation of reefs surrounding the islands of Tanzania has led to the examination of a number of management strategies in the region. The Mafia Island Marine Park (MIMP) located in Mafia Island and the Menai Bay Conservation Area

[82] J.G. Cuevas and G. van Leersum, "Project 'Conservation, Restoration, and Development of the Juan Fernandez Islands, Chile,'" *Revista Chilena de Historia Natural* 74, no. 4 (2001), *SciElo*, Sociedad de Biología de Chile (14 Jan 2009).
[83] Cuevas and van Leersum, "Project 'Conservation, Restoration and Development…'" (2001).

located in Zanzibar have both implemented ecotourism involvement on site in order to mitigate, or ultimately reverse, the effects of environmental degradation on the fragile ecosystem.[84] However, these efforts face irregular monitoring and assessment,[85] potentially creating a disconnection between restoration efforts and the desired outcome. Without regular management, the use of ecotourism as a restoration tool may become a secondary objective relative to increasing the financial benefits of tourism to the region.

Alternatively, Hamad (1998) explores the Misali Island Conservation Area, at Misali Island, Pemba, which is "aimed at establishing a financially self sustaining marine and terrestrial protected area…based on fishing and ecotourism (with community involvement) as the main activities."[86] The major management strategies and activities of the Misali Island Conservation Area share a basic approach with those explored at MIMP and the Menai Bay Conservation Area, yet the Misali monitoring and assessment efforts have been scheduled at two year intervals, increasing the potential for viable restoration to occur.

These examples provide a basis for how ecotourism can potentially aid in restoration and conservation efforts in various ecological settings. Through the implementation of consensus definitions for both *restoration* and *ecotourism*, the ecological understanding of project goals can be better accepted. While the discussed definitions of each term were derived from previously published portrayals of those terms, the lack of overall continuity between any proposed definitions resulted in project goals becoming easily manipulated or misinterpreted. With the root definitions of goals defined in advance, the ultimate project goals and maintenance requirements of a project can be readily determined with little room for interpretation. Thus, the use of ecotourism as a restoration tool will be able to continue to help formulate and foster ecologically and economically responsible operating practices.

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[84] G.M. Wagner, "Coral Reefs and Their Management in Tanzania," *Western Indian Ocean J. Mar. Sci.* 3, no. 2 (2004): 236-237.
[85] Wagner, "Coral Reefs and Their Management in Tanzania," 237.
[86] Hamad (1998) as cited in Wagner, "Coral Reefs and Their Management in Tanzania," 238.

Chapter 4
Choosing the Chesapeake

Initially, social interactions with the environment serve as the catalyst for ecological restoration work to be established. How humans view and make use of the natural environment plays a monumental role in the amount of damage which must be restored. Higgs notes:

> To restore a run of salmon means changing the structure and ecological characteristics of a stream, but it also entails reconfiguring the economic conditions and land-use practices that determine the amount of silt ending up on the spawning beds as well as the social relationships that make up the economy.[87]

Ecologically, restoration has obvious effects and results, given that when a restoration project is undertaken, the expected or anticipated outcome is that of a better functioning local ecosystem, often times emulating the past. However, the ecological implications of a restoration project are not self-standing and social interactions with the environment must also be analyzed as society is inevitably expanding into the natural environment causing that environment to change and adapt accordingly. Yet, due to the rate of human societal expansion, nature has not been able to adapt accordingly resulting in strains on ecosystem functions as well as natural resource availability. For instance, Hasset *et al.* note some important qualities of the nature-society relationship within a watershed ecosystem:

> … rivers and streams are critical to the health of estuaries and coastal areas because they integrate the effects of human activities throughout entire watersheds, serve as spawning areas for anadromous species, and provide water for drinking, irrigation and recreation.[88]

Similarly, since restoration success is heavily dependent on the area in question, society has a responsibility to understand its impact on the natural environment and work to minimize that impact. As a result of protection and restoration, society will in turn be able to continually benefit from the natural resources associated with the surrounding ecosystem.

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[87] Higgs, *Nature by Design,* 2.
[88] B. Hassett, M. Palmer, E. Bernhardt, S. Smith, J. Carr, and D. Hart, "Restoring Watersheds Project by Project: Trends in Chesapeake Bay Tributary Restoration," *Frontiers in Ecology and the Environment* 3, no. 5 (2005): 260.

This concept of expansion versus restoration can be explored using the Chesapeake Bay Watershed as a case study given the high density of populations residing on the shore of the Bay itself or near Bay resource areas. As one of the largest estuaries in the United States, the Chesapeake Bay Watershed (Map 4.1) provides habitat and resources to a variety of organisms and human developments surrounding its vast network of rivers and streams. As a result, human development serves as one of the most destructive factors of the working watershed. The Chesapeake Bay Foundation notes historical changes in Watershed status:

> In the four centuries since the explorations of Captain John Smith, the Chesapeake Bay has lost half of its forested shoreline, more than half its wetlands, nearly 90 percent of its underwater grasses, and more than 98 percent of its oysters. Across the watershed, approximately 1.7 million acres of once-untouched land were developed by 1950. Development has accelerated dramatically since then, with an additional 2.7 million acres built on or paved over between 1950 and 1980.[89]

With surrounding areas at risk of future development (Map 4.2), the Chesapeake Bay consequently faces increased depletion and deterioration of available natural resources and ecosystem functions. Boesch notes the "increasing attention to the connections between the health of ecosystems and human health and, in another dimension, between ecosystem and economic 'health.'"[90] Thus, in order to understand the magnitude of these relationships, the variety of available Bay resources; Bay restoration efforts, including an assessment of Bay health scores; and the local economic benefits of Bay restoration should be examined. In turn, this understanding will provide insight as to why the opportunity for ecotourism to work in conjunction with ecological restoration efforts within the Chesapeake Bay Watershed should be embraced as a tool for restoration project managers.

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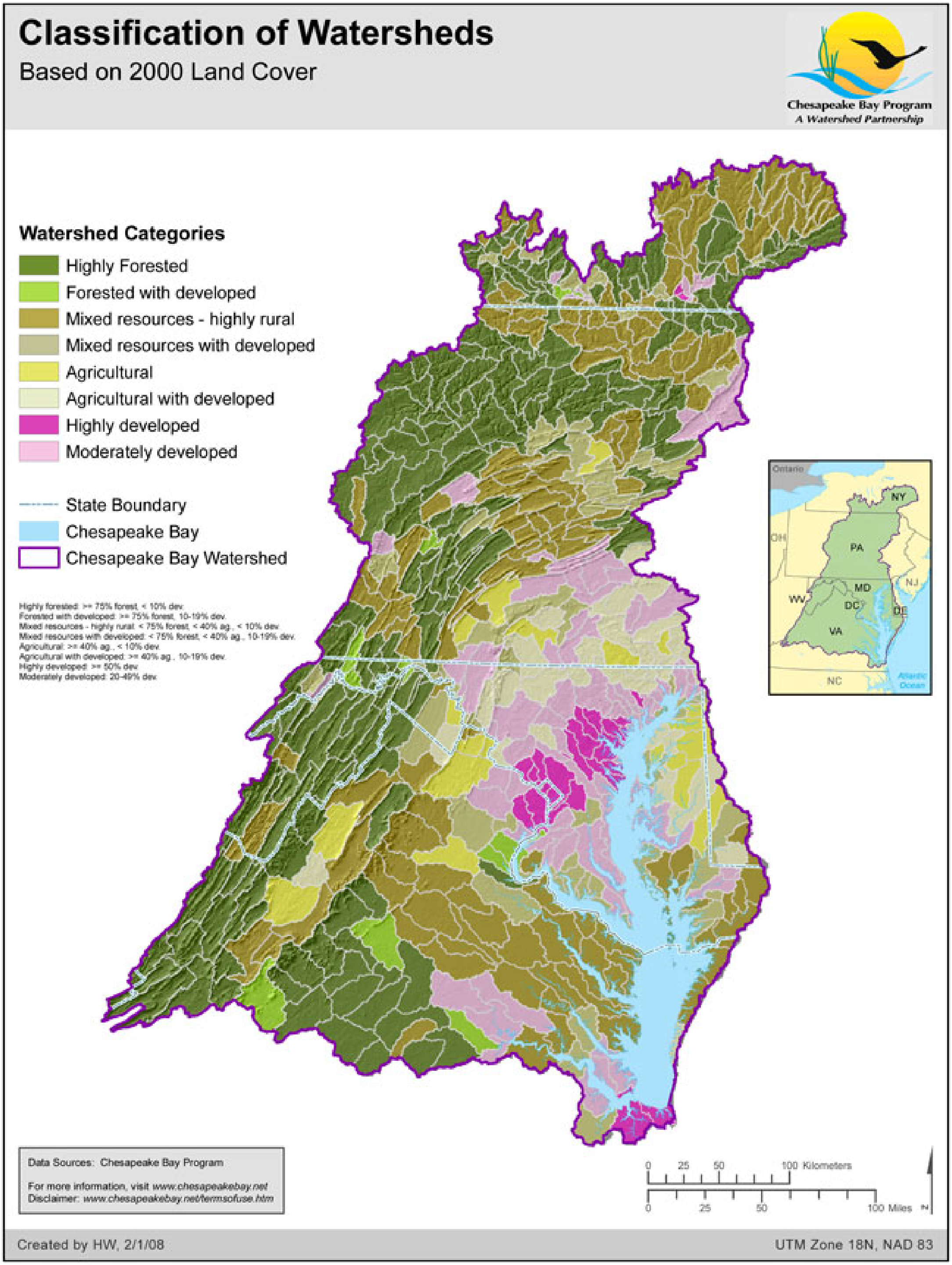
[89] Chesapeake Bay Foundation, "Restore," *Chesapeake Bay Foundation*, 2010, http://www.cbf.org/Page.aspx?pid=452 (1 March 2010).
[90] D.F. Boesch, "Measuring the Health of the Chesapeake Bay: Toward Integration and Prediction," *Environmental Research Section A* 82 (2000), 134.

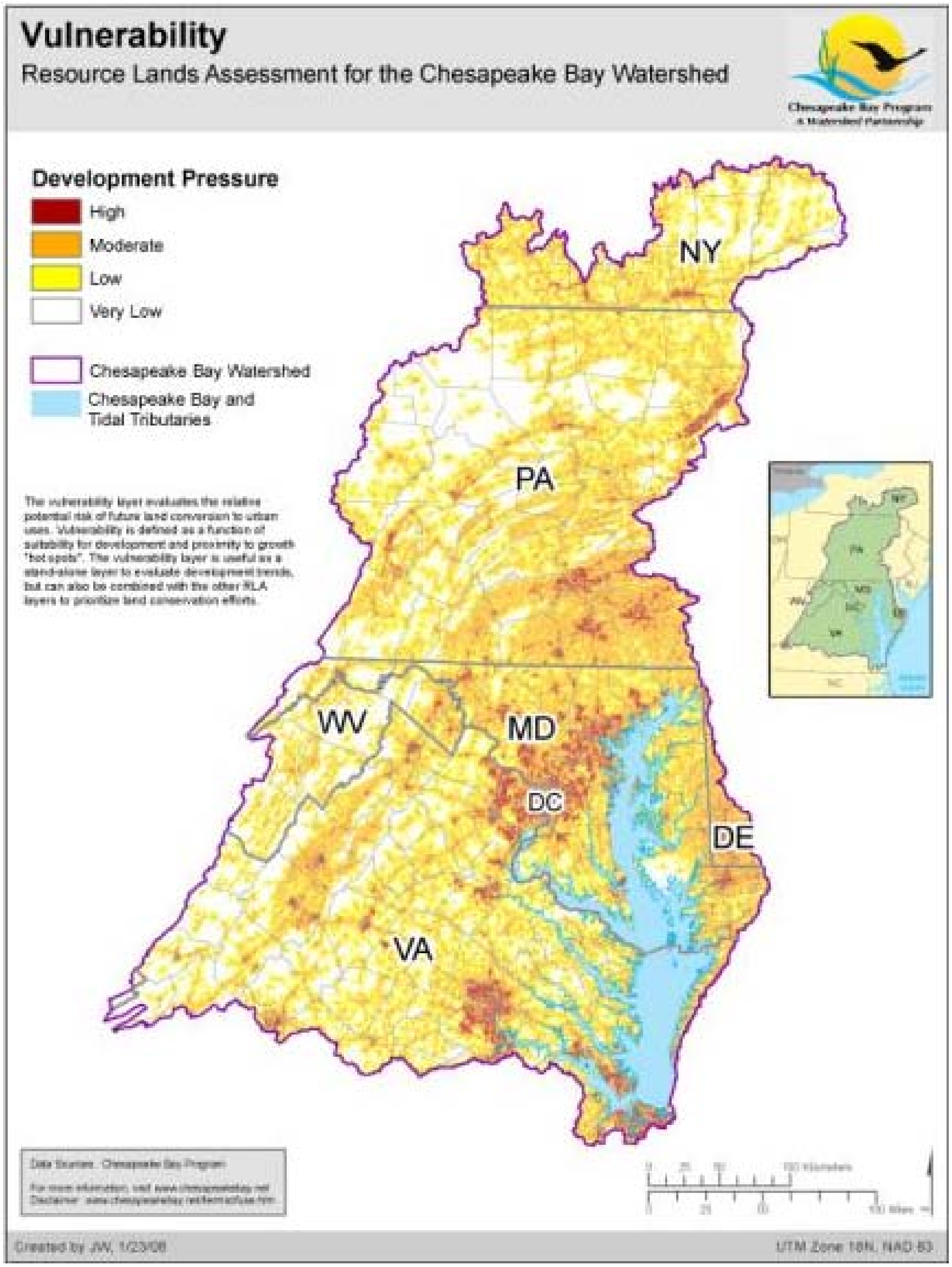
Map 4.1: Chesapeake Bay Watershed classifications by category



Map 4.1: Map of the Chesapeake Bay Watershed classifications (main) spanning six states (inset).[91]

[91] Chesapeake Bay Program, "Maps- Bay Watershed," 28 Jan 2010 http://www.chesapeakebay.net/maps.aspx?menuitem=16825 (27 April 2010).

Map 4.2: Chesapeake Bay Watershed vulnerability due to development pressures by category



Map 4.2: Map of the Chesapeake Bay Watershed vulnerability due to varying levels of development pressures. "The vulnerability layer evaluates the relative potential risk of future land conversion to urban uses. Vulnerability is defined as a function of suitability for development and proximity to growth 'hot spots'" (inset text). [92]

[92] Chesapeake Bay Program, "Maps- Bay Watershed," (27 April 2010).

4.1 Bay Resources in Brief

The discussion of natural resources of the Chesapeake Bay yields two distinct resource types. First, the Bay provides a number of "biological components ranging from phytoplankton densities, aquatic vegetation habitat, and trophic structures topped by diverse fisheries… [including] 32 species of year-round residents, as well as some 260 migrants, mostly anadromous shad, herring and perch."[93] The combination of tidal movement and the salinity gradient present in the change from salt to fresh water throughout the Bay system results in some calculations of plant and animal life within the Bay measured at upwards of 3600 species.[94]

Of these species, native oyster (*Crassostrea virginica*), blue crab (*Callinectes sapidus*), the striped bass (*Morone saxatilis*), or rockfish, are a few of the most notable products of the Bay.[95] Powledge states:

> Several of these, notably the blue crab, spend parts of their life cycles in different salinities; others, such as the river shad, used the bay and its tributaries as part of their migratory journeys until they were depleted by overfishing, pollution, destruction of habitat, and dam construction… Waterfowl make extensive use of the bay in their migrations along the Atlantic Flyaway. An estimated 70 to 90 percent of the Atlantic striped bass…spawn in the bay.[96]

Without the preservation and restoration of Bay habitat, these species will not be able to sustain future populations within the Watershed.

The Bay also provides ecosystem services, the second resource type. These services include biological services such as water filtration by shellfish; habitat and sustenance for surrounding human and wildlife populations; and production of oxygen.[97] Given the extent of development surrounding the Bay, these ecosystem services provide residents and visitors with local health necessities. However, if not properly managed

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[93] Goetz and Jantz, "Integrated Analysis of Ecosystem Interactions with Land Use Change," 264.
[94] F. Powledge, "Chesapeake Bay Restoration: A Model of What?" *BioScience* 55, no. 12 (2005): 1033.
[95] Goetz and Jantz, "Integrated Analysis of Ecosystem Interactions with Land Use Change," 264; D. Lipton and R. Hicks, "The Cost of Stress: Low Dissolved Oxygen and Economic Benefits of Recreational Striped Bass (*Morone saxatilis*) Fishing in the Patuxent River," *Estuaries* 26, no. 2, Part A (2003): 310; and Powledge, "Chesapeake Bay Restoration: A Model of What?" 1033.
[96] Powledge, "Chesapeake Bay Restoration: A Model of What?" 1034.
[97] Goetz and Jantz, "Integrated Analysis of Ecosystem Interactions with Land Use Change," 264.

and restored, depletion of Bay health dynamics will subsequently impact human health levels. Boesch notes:

> …it has been suggested that deterioration in ecosystem health of coastal waters such as the Chesapeake Bay increases risks to human health… [such as] (1) exposure to toxic chemicals; (2) risks of infection by pathogens, including those of human origin, under eutrophic conditions; and (3) frequency and intensity of production of biotoxins by harmful algae.[98]

In order to maintain the function of Bay ecosystem services, restoration efforts must continue to further reduce these risks "through more intensive and more sophisticated monitoring for pathogens and toxic substances."[99] A number of specific Bay restoration efforts are discussed in section 4.2.

4.2 Restoration in the Bay

With the Chesapeake Bay Watershed spanning 64,000 square miles, six states and Washington, D.C.,[100] restoration efforts to maintain a functioning ecosystem are variable, including riparian zone management, water quality improvement, and stream bank stabilization,[101] given differences in land development practices in each portion of the watershed. Since "[restoration] of degraded streams and riparian buffers leads to species recovery, improved inland and coastal water quality, and the creation of habitat for wildlife and recreational activities,"[102] it is only plausible that Bay restoration efforts will continue. Through the construction of a database, Hassett *et al*. note that although only 126 restoration projects were completed in the watershed before 1995, the number increased to more than 4700 projects completed by July 2004.[103] With this information it is likely that restoration project numbers have continued to increase since 2004. This increase in the number of restoration projects implemented is most likely attributed to the

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98 Boesch, "Measuring the Health of the Chesapeake Bay," 136.
99 Boesch, "Measuring the Health of the Chesapeake Bay," 137.
100 S.J. Goetz and C.A. Jantz, "Integrated Analysis of Ecosystem Interactions with Land Use Change: The Chesapeake Bay Watershed," *Ecosystems and Land Use Change: Geophysical Monograph Series* 153 (2004), 263. and Powledge, "Chesapeake Bay Restoration: A Model of What?" 1033.
101 Hassett *et al*., "Restoring Watershed Project by Project," 262.
102 Hassett *et al*., "Restoring Watershed Project by Project," 260.
103 Hassett *et al*., "Restoring Watershed Project by Project," 260.

national attention to and government funding of the Chesapeake Bay Watershed projects, in comparison to comparable basins in the United States.[104]

However, even with an increase in planned and implemented restoration projects relating to the Bay, the Chesapeake Bay Foundation (CBF) has published that the Chesapeake Bay is in less than desirable health. Boesch notes, "A healthy ecosystem… is one that is active, maintains its biological organization over time and is resilient to stress."[105] In a 2004 publication, Goetz and Jantz reveal:

> On a scale of 1 to 100, where 100 indicates a pre-colonial Chesapeake, the Bay currently has a score of just 28. This has changed little since it was initiated [in 1998], fluctuating just a point or two. [Chesapeake Bay Foundation]'s near-term goal is to reach a score of 40 by 2010.[106]

Despite this goal and the goal of reaching a healthy ecosystem via restoration efforts, the Bay's indicated health score has remained unchanged since Goetz and Jantz's publication, still standing at a score of 28 out of 100, [107] an overall score which has been derived through the scoring of pollution, habitat and fisheries criteria within the Bay.

CBF pollution criteria measured include nitrogen and phosphorous loads; water quality as a factor of sediment suspension and algal blooms, caused by excess nitrogen and phosphorous; dissolved oxygen levels; and toxics levels. All pollution scores reported in the 2008 report no change from 2007 levels, except for a two point decrease scored for dissolved oxygen. Ideally, the average total nitrogen and phosphorous loads in the Bay must be reduced to no more than 175 million pounds and 12.8 million pounds respectively in order to maintain healthy Bay waters. The published nitrogen and phosphorous scores indicate that these reductions are still far from being reached. Dissolved oxygen and toxics levels have also received poor grades, indicating overall poor water quality levels in which aquatic life cannot be sustained.[108] This state leads to ecosystem deterioration due to nutrient over enrichment, the associated reduction in light availability, and loss of habitat—resulting in a habitat "that is a less vigorous producer of valuable fish and shellfish, less diverse and well organized, and more susceptible to and

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[104] Hassett *et al*., "Restoring Watershed Project by Project," 264.
[105] Boesch, "Measuring the Health of the Chesapeake Bay," 135.
[106] Goetz and Jantz, "Integrated Analysis of Ecosystem Interactions with Land Use Change," 264.
[107] Chesapeake Bay Foundation, *State of the Bay Report 2008*, 1.
[108] Chesapeake Bay Foundation, *State of the Bay Report 2008*, 6-7.

slower to recover from disturbances."[109] These effects can be observed in a number of marine species throughout the Bay including the monitored fisheries species—rockfish, blue crabs, oysters and shad—scored by CBF in annual reports.

CBF recognizes the effects of ecosystem deterioration on specific species habitats in the 2008 report noting:

> One alarming consequence of this continued degradation is the status of the Bay's icons—rockfish and blue crabs. Indicator scores for both these species dropped this year, due in part, to stress from poor water quality.[110]

While rockfish scores are still presented as high, the score is down from the reported 2007 level due to over 50 percent of surveyed specimen testing positive for mycobacteriosis, circumstantially thought to be caused by stresses from poor water quality and decreased food availability. Similarly, blue crab habitat has been lost and dissolved oxygen levels have "reduced the number of crabs that can be produced and maintained by the Bay." [111]

Restoration activity in the Bay aims to reduce these habitat stressors in order to minimize further levels of habit loss, while subsequently working to restore already degraded habitat through the implementation of forested buffers and the recreation of wetlands. CBF incorporates the evaluation of these processes, in addition to the measurement of underwater grasses and resource lands, as part of their overall Bay health score. The 2008 CBF report indicates no change from 2007 in the measurement of forested buffers and wetland areas. However, underwater grasses and resource land measurements, while still presented as low-scoring, have increased from 2007 levels.

In order to derive this annual health assessment of the Bay, the 1984-established Chesapeake Bay Monitoring Program works to obtain the measurements of "nutrients, suspended sediments, toxicants in water and sediments, water temperature and salinity, water circulation, fresh water inflows, dissolved oxygen, submersed aquatic vegetation, plankton, benthos, and fish and shellfish" at more than 165 monitoring stations throughout the Bay Watershed.[112] Yet even as a stable monitoring effort, Boesch argues:

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[109] Boesch, "Measuring the Health of the Chesapeake Bay," 134.
[110] Chesapeake Bay Foundation, *State of the Bay Report 2008*, 7.
[111] Chesapeake Bay Foundation, *State of the Bay Report 2008*, 14.
[112] Boesch, "Measuring the Health of the Chesapeake Bay," 138.

"All of these [measurements] provide rich, but seldom connected, information streams that serve to inform us regarding the health of the Bay ecosystem."[113] However, any indication of Bay health or progress will serve to outweigh an absence of information as future restoration efforts are planned and implemented.

Despite the established monitoring of current restoration efforts, restoration project monitoring post-completion must also be managed to ensure restoration project goals have been or are in the process of being achieved. In many cases, post-project monitoring has been observed to be minimal. Roni *et al.* states, "Despite the large financial investment in aquatic restoration in recent decades, monitoring and research to evaluate project effectiveness occurs infrequently and often is inadequate to quantify biological response."[114] Similarly, data from Hassett *et al*.'s (2005) restoration database analysis indicates that only 5.4% of the database projects show any form of monitoring post project completion.[115] Furthermore, in a subsequent study, Hassett *et al*. (2007) notes:

> When we went back and looked at the written records for projects that interviewees told us were monitored, there was typically no indication of monitoring and certainly no statement on project outcome. [116]

According to Roni *et al*., designing adequate monitoring and evaluation programs is necessary in order to decrease the potential for mistaking the status of restoration success indicators, such as the population dynamics of target species.[117] Additionally, Hassett *et al*. (2005) notes the relatively minimal funding needed for monitoring purposes in relation to initial implementation costs.[118] Thus, in order to justify the proportionally higher expenditure on the implementation of a restoration project, post-project monitoring plans should be taken into consideration during planning stages.

While it is likely that some monitoring efforts are limited by funding availability, full restoration success may remain un- or even over-accounted for without continued

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[113] Boesch, "Measuring the Health of the Chesapeake Bay," 138.
[114] P.Roni, M.C. Liermann, C. Jordan, and E.A. Steel, "Steps for Designing a Monitoring and Evaluation Program for Aquatic Restoration," in *Monitoring Stream and Watershed Restoration*, ed. P. Roni (Bethesda, MD: American Fisheries Society, 2005), 13.
[115] Hassett *et al*., "Restoring Watershed Project by Project," 263.
[116] B.A. Hassett, M.A. Palmer, and E.S. Bernhardt, "Evaluating Stream Restoration in the Chesapeake Bay Watershed through Practitioner Interviews," *Restoration* Ecology 15, no. 3 (2007): 568.
[117] Roni *et al*., "Steps for Designing a Monitoring and Evaluation Program," 14.
[118] Hassett *et al*., "Restoring Watersheds Project by Project," 265.

monitoring. Without indicating the incorporation of proper management into restoration project plans, restoration success may be miscounted. For instance, Hassett *et al*. (2007) reports a skewed view of restoration project outcomes as those who are invested in the project may have more of "a tendency to report an optimistic picture of project outcome."[119] According to Hassett *et al*. (2007), without implemented monitoring post-completion, true success rates of restoration projects are susceptible to interpretation. Ultimately, Bay restoration project plans must strive to incorporate post-project monitoring in order to maintain project goals in the long run.

4.3 Local Economic Benefit from Bay Restoration Efforts

Loss of habitat, and consequently decrease in species population levels, does not only strain the Watershed ecosystem but also strains the economy dependent on those resources. The Watershed serves as a resource to more than 15 million people residing in the area through income derived from recreation, tourism, real estate and commercial fisheries. Goetz and Jantz further report:

> The latter alone averages 227 thousand metric tons annually, worth up to $200 million in some years…[The blue crab] is of particular concern because crabs are currently, by far, the single most valuable commercial resource of the Bay, comprising over 70% of the total harvest value.[120]

Declines in blue crab population due to habitat loss and increased dissolved oxygen levels have continued to hurt dependent fisheries stakeholders. In an effort to aid in the reestablishment of the blue crab population, "Maryland and Virginia enacted new harvest rules that cut the catch of female crabs by one third … [as the] crab population cannot sustain the same amount of harvest by crabbers."[121] Future blue crab populations will only thrive through increased habitat restoration and pollution reduction efforts.

Similarly, a number of studies have been conducted in attempt to value the economic benefit of improved Bay health. For example, through the use of contingent valuation methodology as well as indirect market methodology in a 1989 study, Bockstael, McConnell and Strand aimed to measure the economic benefits of improved

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[119] Hassett *et al*., "Evaluating Stream Restoration," 568-569.
[120] Goetz and Jantz, "Integrated Analysis of Ecosystem Interactions with Land Use Change," 264.
[121] Chesapeake Bay Foundation, "State of the Bay 2008," 14.

water quality in the Chesapeake Bay. Calculated benefits of improved water quality resulted in a range of benefit estimates between slightly less than $10 million to more than $100 million in 1984 dollars. Bocksteal, McConnell and Strand justify these findings in stating:

> Society has undertaken an investment program. The nature of the program is the cleanup of the Chesapeake Bay. The costs of the program include construction of sewage treatment plants, funding of government programs to regulate and monitor agricultural effluents, subsidy of best management practice, installation of industrial waste disposal systems, and restrictions on housing development. The annual returns on the investment program are measured by what people are willing to pay for the improved services. This is the dividend yielded by the public's investment program. Our estimate of this divided is in the range of $10-100 million, in 1984 dollars.[122]

These values indicate the variance expected from measuring public willingness to pay for an ecosystem service as each respondent will inevitably have an individual preference for one service in relation to an available substitute.

In measuring the effects of dissolved oxygen (DO) levels on recreational fishing in the Chesapeake Bay, Lipton and Hicks found that reduction in water quality due to a negative change in DO levels "would lead to an annual economic loss to all Chesapeake Bay anglers of $51,866, with a net present value of $1.04 million," incorporating both valuation from expected catch as well as the value of bass fishing to the surveyed anglers.[123] Similarly, Lipton also conducted a study of Maryland registered boat owners' willingness to pay for a general improvement in water quality in the Bay. Overall, Lipton found "the total annual willingness to pay for a one step improvement in water quality was approximately $7.3 million… [and the net present value], assuming a 5% discount rate is approximately $146 million."[124]

While the findings presented in these studies are variable in calculated willingness to pay for improvements in water quality, they are not to be dismissed. Ultimately, water quality improvement through restoration efforts in the Chesapeake Bay will inevitably

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[122] N.E. Bockstael, K.E. McConnell, and I.E. Strand, "Measuring the Benefits of Improvements in Water Quality: The Chesapeake Bay," *Marine Resource Economics* 6 (1989): 17.
[123] Lipton and Hicks, "The Cost of Stress," 311-314.
[124] D. Lipton, "The Value of Improved Water Quality to Chesapeake Bay Boaters," Working Paper, Department of Agriculture and Resource Economics, University of Maryland, College Park (2003): 11.

provide positive net benefits to the recreational participants in the Bay. Thus, the economic benefit of water quality improvement in combination with the economic benefit of increased resource species population levels, rely heavily on the continuation of current, monitoring of completed, and implementation of future restoration projects throughout the Bay.

4.4 Combining Ecotourism Activity and Restoration Efforts in the Bay

Understanding ecological restoration and ecotourism activity in the Chesapeake Bay Watershed—what it is, where it takes place, how it works—will help to provide a sense of interaction between the two operations. The provided synthesized definitions of each term serve as categorical indicators of what does, or does not, constitute as a restoration or ecotourism activity. This knowledge can then be used to further understand the connection between the two. Provided that the ecotourism sites are located in close proximity to the restoration sites, ecotourism operations in the Watershed have the potential to provide valuable resources to planned and implemented restoration projects in the surrounding areas. Ecotourism sites can not only help to educate the public about local restoration initiatives, but also have the potential ability to organize volunteer groups to leave from the site to aid in nearby restoration implementation or monitoring efforts. Using the Chesapeake Bay as a case study, Chapter 5 will provide a baseline understanding of how ecotourism-restoration interactions can be mutually beneficial to the respective operations. This baseline will also yield the potential to use the described mapping methods to create a local proximity analysis.

Chapter 5
Exploring Proximity in the Chesapeake Bay Watershed
A Case Study

5.1 Mapping Ecological Restoration Activity

5.1.1 *Bay Restoration Organizations and Projects*

Given that the Chesapeake Bay Watershed provides a variety of natural habitat as well as human-oriented land use opportunities, ecological restoration of the Bay becomes a crucial focal point to the local communities and its visitors as the Bay's health is directly correlated with the economic benefits which can be derived from Bay resources. With this in mind, a number of organizations have implemented restoration projects throughout the Bay.

The Chesapeake Bay Foundation (CBF), founded in the 1970s, is an independent 501(c)(3) organization working to improve bay health through pollution reduction efforts and increasing of natural filter abundance in the watershed.[125] With the help of government, businesses, and citizen partners, CBF "fights for strong and effective laws and regulations"[126] which ultimately aim to uphold their motto to "Save the Bay".

Another restoration-oriented organization focused on the Bay is the Chesapeake Bay Program (CBP). Since its implementation in 1983, the Chesapeake Bay Program has worked with its partners to reduce pollutants being discharged into the Bay in order to restore the Bay's living resources.[127] CBP partners range from federal and state agencies and local governments to non-profits and academic institutions working together to implement, fund, complete, and educate the public about Bay projects related to restoring water quality, habitat restoration, managing fisheries and protecting watersheds.[128]

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[125] Chesapeake Bay Foundation, "About Us," *Chesapeake Bay Foundation*, 2010, http://www.cbf.org/Page.aspx?pid=259 (1 March 2010).
[126] Chesapeake Bay Foundation, "Mission and Vision," *Chesapeake Bay Foundation*, 2010, http://www.cbf.org/Page.aspx?pid=387 (1 March 2010).
[127] Chesapeake Bay Program, "History of the Chesapeake Bay Program," *Chesapeake Bay Program Office*, 23 Nov 2009, http://www.chesapeakebay.net/historyofcbp.aspx?menuitem=14904 (1 March 2010).
[128] Chesapeake Bay Program, "About the Bay Program," *Chesapeake Bay Program Office*, http://www.chesapeakebay.net/aboutus.aspx?menuitem=14001 (1 March 2010). and Chesapeake Bay Program, "Bay Restoration," *Chesapeake Bay Program Office*, http://www.chesapeakebay.net/bayrestoration.aspx?menuitem=13989 (1 March 2010).

NOAA, the National Oceanic and Atmospheric Administration, also serves as a primary source of a large span of Chesapeake Bay restoration projects. Collectively, a number of NOAA offices work to oversee the health and restoration of the Chesapeake Bay through the monitoring of fisheries, removal of invasive species and dams, modification of culverts, increasing natural filtration systems, and rebuilding native oyster populations.[129]

These organizations are the primary entities in control of restoration projects in the Chesapeake Bay area, although they do not work alone. Each organization works with the others as well as with multiple partners ranging from government to non-profit, to private organizations. The network built through these connections helps to maintain a sustainable restoration effort throughout the Bay.

5.1.2 *Mapping Locations*

Mapping ecological restoration projects in the Chesapeake Bay Watershed is limited by two main factors: multiple organizations are involved in a variety of restoration projects, therefore resulting in a large magnitude of possible locations for mapping. Although many organizations work together through partnerships, many restoration projects are managed individually by the primary organization. As a result, each organization might limit access to public information. For instance, Chesapeake Bay Foundation and Partners published a map of watershed restoration projects in the Chesapeake Bay Watershed (Map 5.1). However, despite multiple correspondence attempts, access to restoration site coordinates or addresses have not been made available for all sites mapped.

Alternatively, restoration sites from NOAA were made available through an ArcIMS GIS data server provided by the NOAA Restoration Center. As previously noted, although the provided NOAA data does not depict all restoration sites throughout the Watershed, the data does provide a base level on which to work from. Thus, for the purpose of this part of the study only NOAA restoration sites have been mapped and sorted according to project statuses: planning stage, implementation stage,

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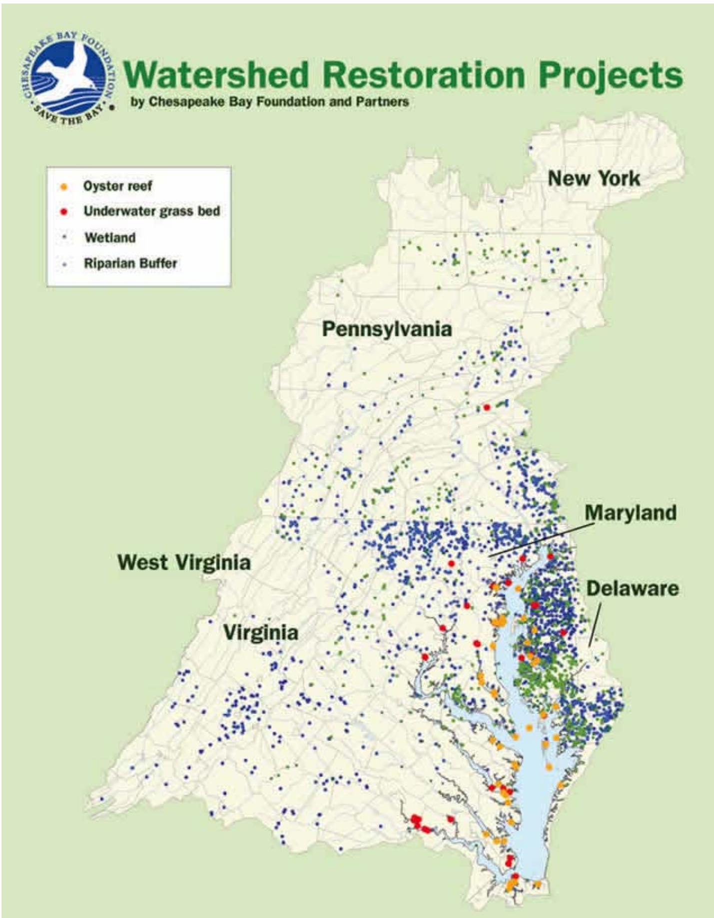
[129] NOAA's Office of Legislative and Intergovernmental Affairs, "NOAA in Your State: Maryland," *National Oceanic and Atmospheric Administration, United States Department of Commerce*, 2010, http://www.legislative.noaa.gov/NIYS/ (1 March 2010).

implementation complete, and project terminated (Map 5.2). While only mapping these selected sites for this project is less than ideal, the base line will provide a good direction as to what additional information may be necessary to create and manage a successful ecotourism operation-restoration project working partnership.

Map 5.1: Chesapeake Bay Foundation and Partners' Watershed Restoration Projects in the Chesapeake Bay



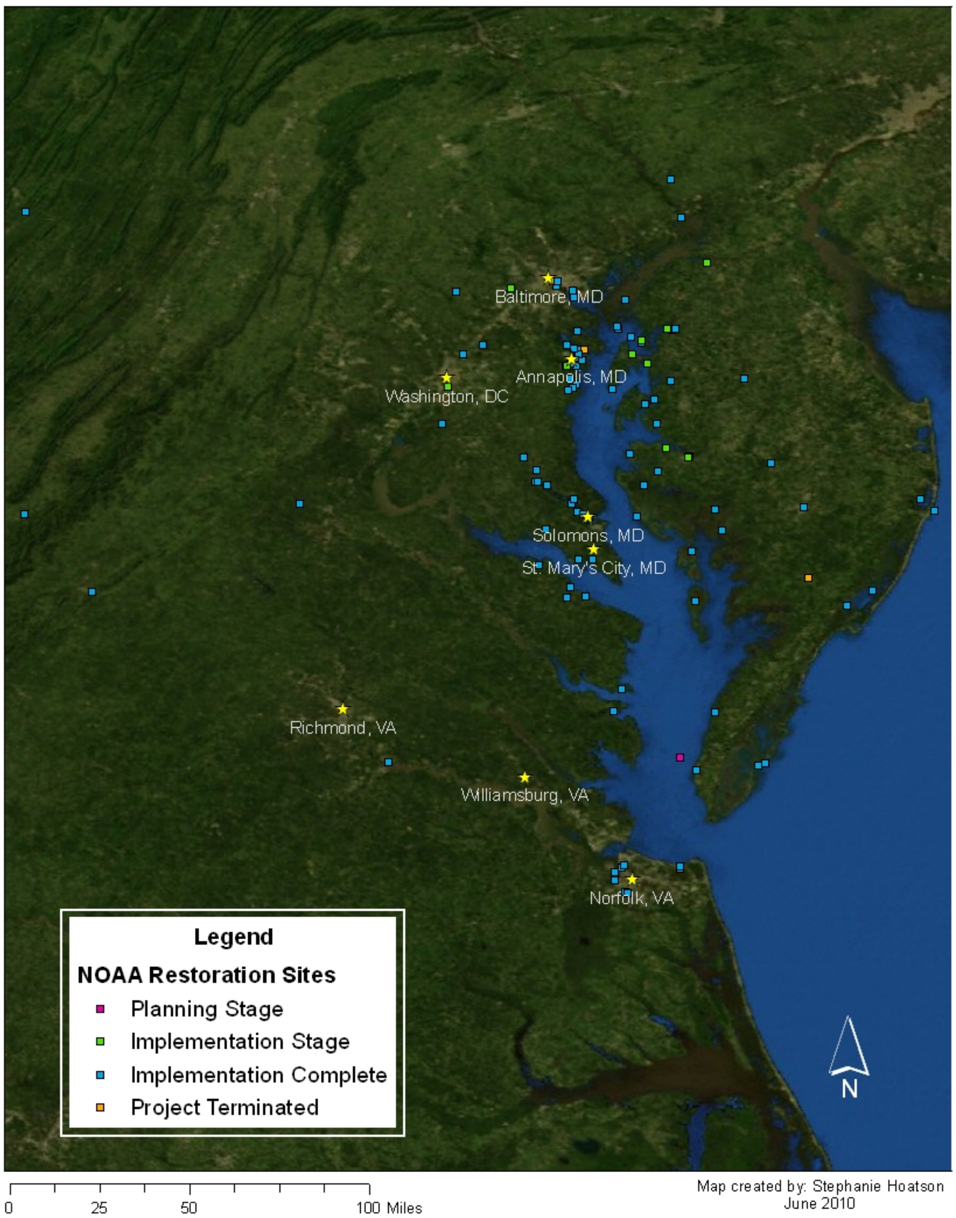
Map 5.1: Map of Watershed Restoration Projects presented by Chesapeake Bay Foundation and Partners. As depicted, restoration projects have been sorted by type: oyster reef (orange), underwater grass bed (red), wetland (green), and riparian buffer (blue).[130]

NOAA's Chesapeake Bay data included sites throughout the Watershed, yet for the purpose of this study only sites in the Maryland-Virginia portion of the Watershed were used for mapping as a majority of the mapped ecotourism sites fall within the Lower Watershed with minimal outliers extending into the Upper Watershed. The site

[130] Chesapeake Bay Foundation, "Maps: Watershed Restoration Projects," *Chesapeake Bay Foundation*, 2010, http://www.cbf.org/Page.aspx?pid=944 (1 March 2010).

information was clipped from the complete dataset through ArcGIS software tools.[131] Sites were then sorted and labeled according to project status: planning stage, implementation stage, implementation complete, and project terminated sites. The resulting map is presented in Map 5.2.

Map 5.2: NOAA Chesapeake Bay ecological restoration sites



Map 5.2: NOAA ecological restoration sites sorted by project stage: planning (pink), implementation (green), implementation complete (blue), and project terminated (orange), in the Maryland-Virginia portion of the Chesapeake Bay Watershed.

[131] A list of mapped NOAA ecological restoration sites is presented in Appendix 1.

5.2 Mapping Ecotourism Activity

5.2.1 *Determining "Ecotourism" Operations*

Since tourism, and in this case ecotourism, is dependent on the natural environment interacting with the human environment of that area, any degradation of the natural area would likely result in an ultimate decline in tourist activity. This degradation and decline is not only detrimental to the immediately affected natural ecosystem but is just as detrimental to the human economy which relies on the resulting revenue from the related tourist activity.[132] However, as environmental awareness becomes more popular, in the sense that an increasing number of companies have started to "green" their products and accordingly advertise them as such, many tourist operations might aim to target new audience members by also advertising their operation as "eco-friendly" or general area tours as "eco-tours." With these new labels, general tourism operations have the potential to capitalize on the growing interest in environmentally friendly products. However, many "ecotourism" operations may not necessarily be supplying the exact product advertised or demanded by ecologically minded consumers. For example, a hypothetical kayak rental company may advertise its business as an ecotourism operation while the practice does not participate in the defined ecotourism goals. Alternatively, only operations which meet standardized criteria, such as those suggested by the discussed synthesized definition of "ecotourism," should be allowed to be advertised as such.

The synthesized definition of ecotourism breaks down the concept into four distinct parts. First, the tourism must be ecologically sustainable. Second, tourists must actively participate in conservation and restoration efforts in the surrounding natural area. Third, the active participation should have the potential to increase the visitor's personal environmental responsibility and education level. Finally, the operation must result in an economically viable situation for the local culture and population. While the criteria as a whole create an ideal ecotourism operation, a main component of the operation should result in education of and physical contribution to conservation and restoration activity in the area—a key concept separating this idea of ecotourism from general tourism activity.

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[132] Sinclair and Stabler, *The Economics of Tourism*, 156.

Chesapeake Bay Gateways Network (CBGN), a National Park Service, has worked to connect residents and visitors to a variety of parks, refuges, museums, historic sites, land and water trails throughout the Chesapeake Bay Watershed since 2000.[133] Ultimately, CBGN goals include:

> …[helping] the American public access, enjoy, understand and appreciate the natural, cultural, historic and recreational resources and values of the Chesapeake and its rivers and engage in their stewardship [through educating] people about the Bay and [helping] them learn its stories through place-based interpretive education, [facilitating] access to the Chesapeake and Chesapeake-related resources, and [fostering] conservation & restoration of the Chesapeake and its rivers, stimulating public understanding of and involvement in stewardship.[134]

As a resource, CBGN can potentially work with its partnership members to increase educational and field work opportunities available to the visiting public. Ultimately, this interaction will inevitably result in an increased coordination effort on the parts of both CBGN and its partnership members, which may be subject to personnel and/or economic limitations. Staff at participating ecotourism centers may not be familiar with local restoration efforts and would thus be subject to further training in regard to the projects with which they will be associated. Further training increases the time and resources required for an adequate coordination effort to exist, which may be limited by economic funding constraints on one or both sides of the ecotourism-restoration coordination effort. However, for the purpose of this study, CBGN partnership members will be presented as possible ecotourism-restoration coordination centers.

5.2.2 *Mapping Locations*

A list of Chesapeake Bay Gateways Network partnership members was provided via a promotional pamphlet from CBGN, listing 151 of the 158 sites publicized on the organization's website. For the purpose of this primary case study, only the sites listed in the promotional pamphlet are presented through GIS mapping.[135] Ecotourism sites were

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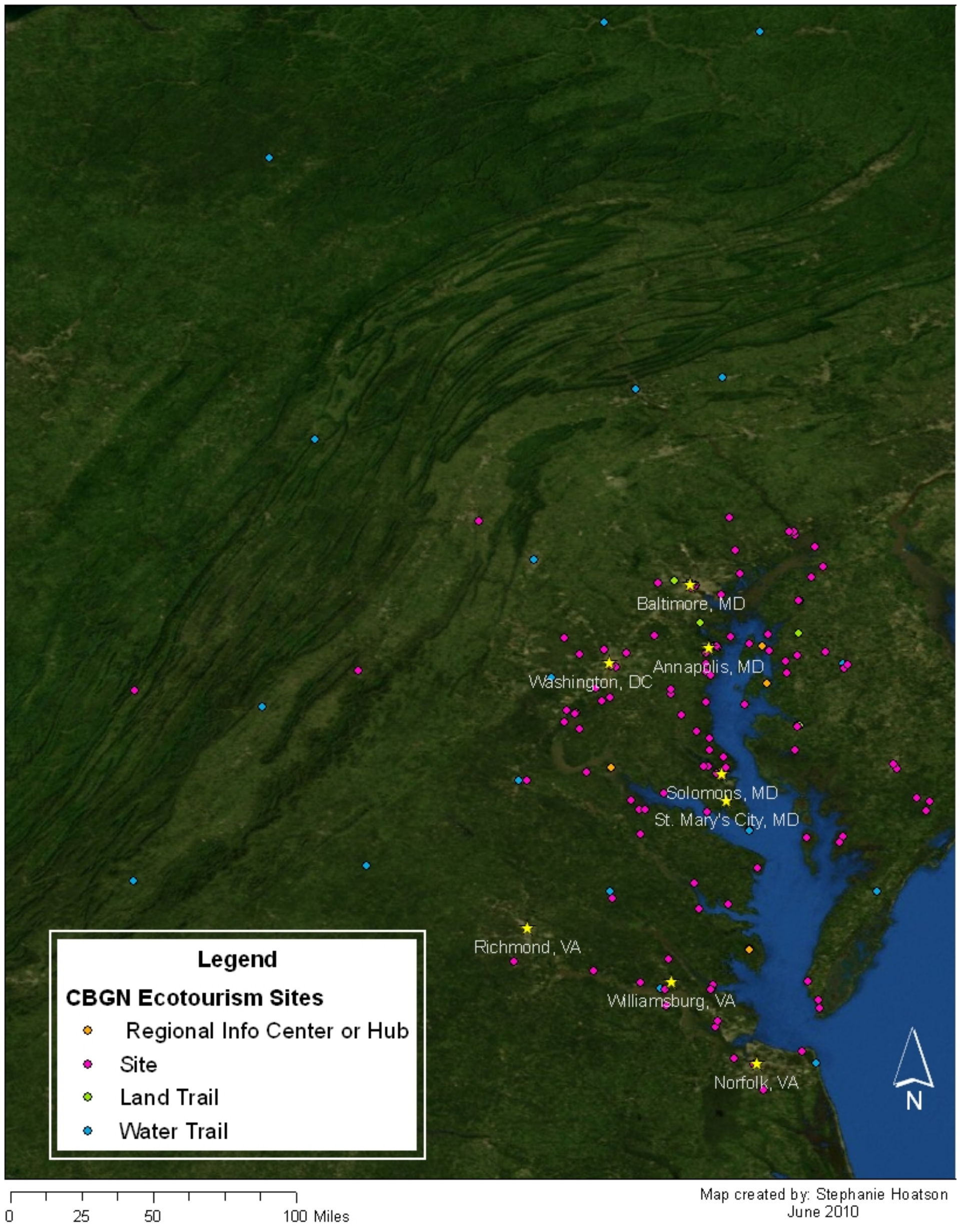
[133] Chesapeake Bay Gateways and Watertrails Network, "Gateways Network Mission and Vision," *Chesapeake Bay Gateways Network*, 2009, http://baygateways.net/vision.cfm (1 Feb 2010).
[134] Chesapeake Bay Gateways and Watertrails Network, "Chesapeake Bay Gateways Strategic Plan 2006-2008," *Chesapeake Bay Gateways Network*, October 2005, http://baygateways.net/pubs/CBGN_Strategic Plan.pdf (1 Feb 2010).
[135] See Appendix 2 for a complete list of Chesapeake Bay Gateways Network sites plotted.

labeled according to Gateway type: Gateway Regional Info Center or Hub, Gateway Site, Gateway Land Trail, or Gateway Water Trail. Major cities were also mapped to provide a spatial reference on the land map. The resulting map is presented in Map 5.3.

Map 5.3: Chesapeake Bay Gateways Network partners ecotourism sites



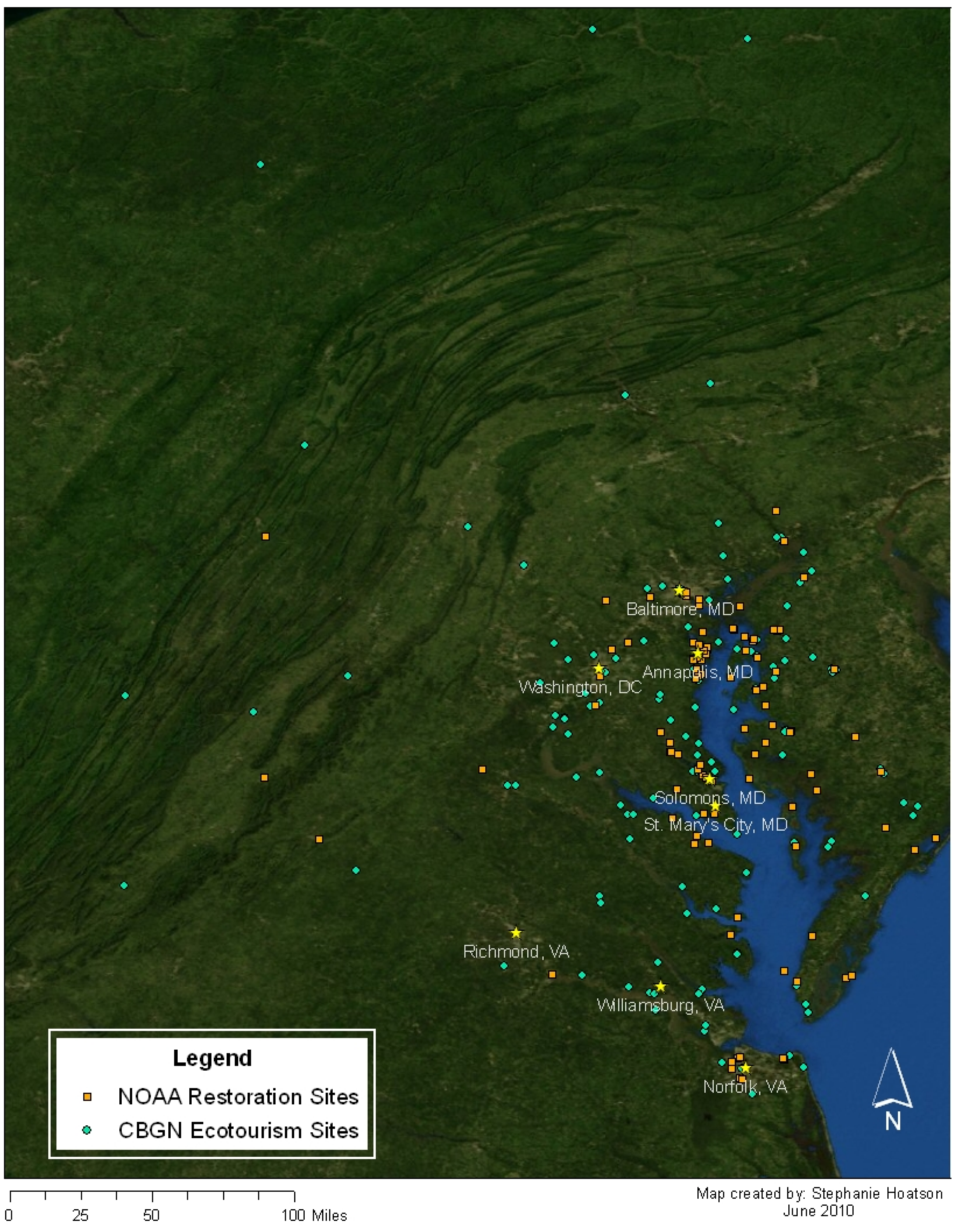
Map 5.3: Chesapeake Bay Gateways Network ecotourism sites in the Chesapeake Bay Watershed, sorted by gateway type: regional info center or hub (orange), site (purple), land trail (green), or water trail (blue).

5.3 A Spatial Analysis: Measuring Proximity in the Chesapeake Bay

5.3.1 *Mapping Ecological Restoration Sites with Ecotourism Sites*

With both ecological restoration and ecotourism sites individually mapped, a spatial analysis of how they could potentially work together can be conducted by first mapping the locations together. Each layer has been added to the base ArcMap file in order to see each set of sites in the same mapping plane. With this new base map, a spatial analysis of the sites can be conducted.

Map5.4: Base map of restoration and ecotourism sites in the Chesapeake Bay Watershed



Map 5.4: NOAA ecological restoration sites (orange, square) and Chesapeake Bay Gateways Network partnership ecotourism sites (blue-green, circle) overlayed to form a spatial basemap. Major cities (yellow, star) have been added to provide further spatial reference.

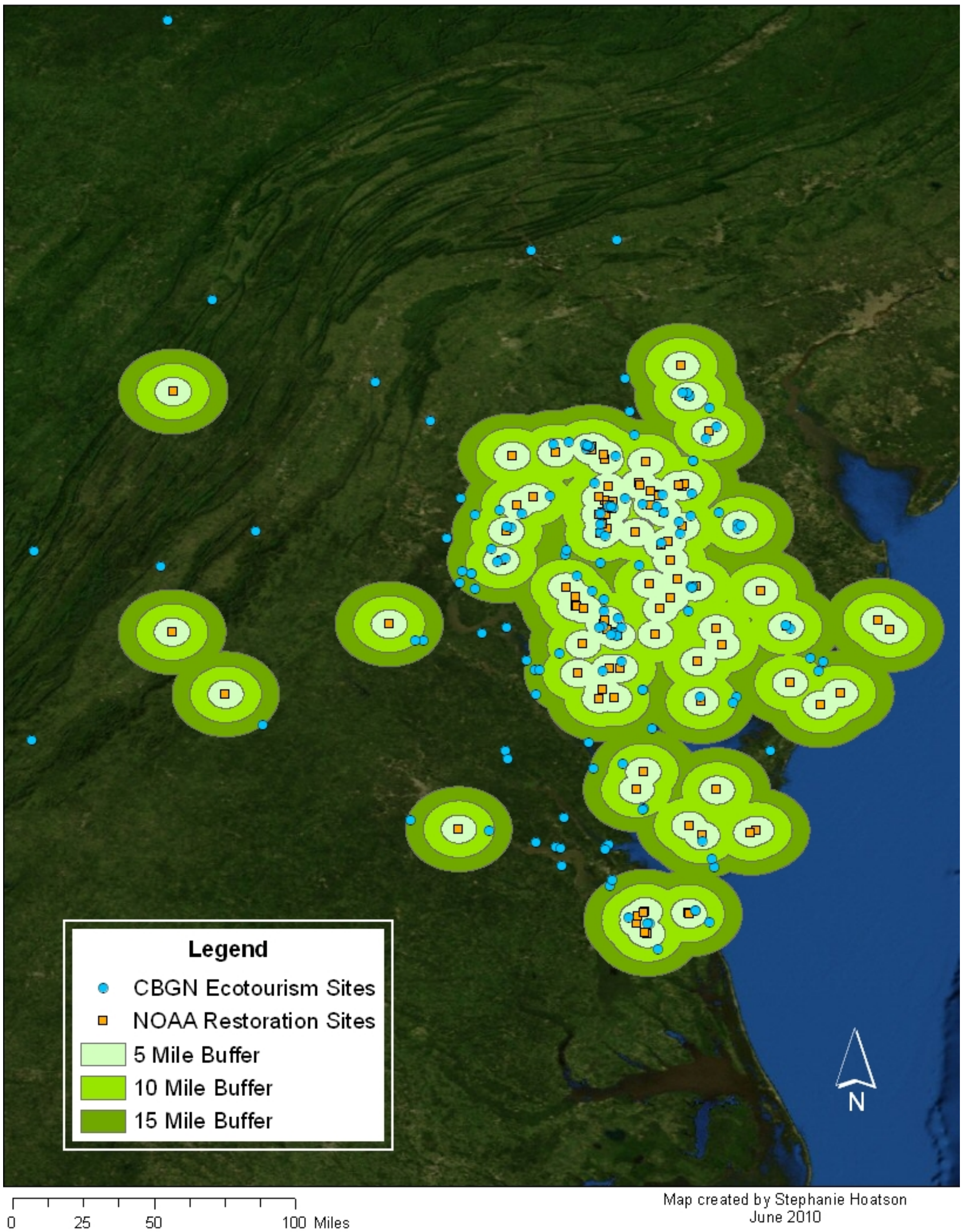
5.3.2 *Spatial Methods and Results*

Using distance as a function of measurement, distance buffers have been chosen in order to simplify proximity measurements between ecotourism and ecological restoration sites. Distances of 5, 10 and 15 miles have been chosen in order to account for the nearest ecotourism operation locations to restoration project locations. Buffer distances have been chosen assuming 15 miles as a relative estimate of the maximum distance an ecotourism participant would be willing to travel for restoration aid work. Each layer of buffers has been dissolved, removing overlapping edges, in order to observe the clustering effects around the plotted restoration locations. Mapped buffer results are depicted in Map 5.5.

Since buffers have been drawn outward from ecological restoration sites, any ecotourism sites mapped within buffer distances can be considered in close proximity to the restoration sites. After mapping the chosen distance buffers, sites located within buffer spans have been separated out through selecting sites in the ecotourism location layer limited to those that fall within each buffer layer. The attributes of the selected features (ecotourism sites), including number of features which fall within that buffer, could then be examined. When examining the number of ecotourism sites within each buffer, out of the 151 CBGN ecotourism sites mapped, 71 are located within five miles from the mapped restoration sites, 95 are located within ten miles, and 116 are within fifteen miles.

According to the mapped locations and buffer distances, a majority of the Chesapeake Bay Gateways Network ecotourism operations fall within close proximity to the NOAA-supported ecological restoration project locations. Of the mapped CBGN ecotourism sites, 47%, 63%, and 77% are located within 5, 10 and 15 miles of NOAA-supported ecological restoration locations, respectively. These values, however, are likely to increase with the availability of additional ecological restoration site information. As a result, the ecotourism locations which fall in close proximity to the ecological restoration locations would theoretically be able to aid restoration project implementation and monitoring. The next part of this chapter will discuss specific clusters of ecotourism-ecological restoration relationships present in the Bay Watershed. However, the specific level of aid provided by the ecotourism sites will depend heavily on the restoration type and project needs. Similarly, public access to certain project sites may be limited, eliminating the potential ecotourism-restoration coordination opportunity.

***Map 5.5*: Distance buffers derived from mapped ecological restoration sites**



Map 5.5: 5, 10 and 15 mile distance buffers from NOAA ecological restoration sites mapped with CBGN ecotourism sites in the Chesapeake Bay Watershed.

5.4 Discussing Feasibility

5.4.1 *Using Ecotourism as an Aid to Ecological Restoration in the Chesapeake Bay Watershed*

In order to provide a suitable understanding of how tourism practices, in particular ecotourism practices, should be handled in order to maintain a working dynamic between the environment and societal requirements, tourism management practices should be examined and taken into consideration. The idea of a community approach to tourism planning suggests that the planning should be "reconstructed so that environmental and social factors may be placed alongside economic considerations."[136] Alternatively, general tourism planning takes on a theoretical tourism planning model which isolates the planning process from the environmental, social, and economic factors taken into consideration when adopting a community approach to planning.[137] In the case of theoretical tourism planning, each factor is measured independently of one another rather than as a connective whole. This process has the potential to result in some benefits, or costs, of the tourism operation to be lost in analysis. Thus, for the purpose of ecotourism management practices, the community approach to planning will help to provide a more complete understanding of the efforts necessary to create a successful operation which works to follow the defined ecotourism criteria.

Although general tourism and ecotourism exemplify different operations, some aspects of general tourism practices are still incorporated into the environmentally conscious alternative. As a result, general tourism planning processes can still be applied to ecotourism planning, provided some modification. In relation to the Chesapeake Bay, a theoretical approach seems implausible as many outside factors play a role in the success of an ecotourism operation. Alternatively, the local community approach to ecotourism planning can beneficially aid both the local ecotourism operations as well as the surrounding ecological restoration project areas. According to Nowaczek, Moran-Cahusac, and Fennell (2007):

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[136] R.K. Dowling and D.A. Fennell, "The Context of Ecotourism Policy and Planning," in *Ecotourism Policy and Planning*, edited by D.A. Fennell and R.K. Dowling, 1-20, Cambridge, MA: CAB International (2003), 7.

[137] R.K. Dowling and D.A. Fennell, "The Context of Ecotourism Policy and Planning," 7.

> The major challenge is to develop a plan for community involvement and empowerment, both in terms of resident participation in and ownership of the project, and fair distribution of the benefits (defined beforehand) and costs (accounted for at the planning stage) from the ecotourism project. Initially this can be achieved by providing practical and accessible ecotourism education and training in various fields. More meaningfully, having established a position of dialogue for the local populations, visitors can be readily informed of local needs and projects for their contribution.[138]

Thus, an interdisciplinary approach to ecotourism management must be applied, taking into consideration the environmental, social, and economic factors which work together to drive the operation as a whole.

Through the mapping and spatial analysis of ecological restoration and ecotourism sites located throughout the Chesapeake Bay Watershed, in particular the lower portion of the watershed incorporating areas directly around the Bay, proximity of site locations is visually presented. A complete listing of sites within buffer levels from the mapped restoration sites are presented as appendices. With approximately 77% of the total number of ecotourism operations mapped falling within fifteen miles of Bay restoration project locations, the potential for ecotourism operations to aid in, or harm, ecological restoration efforts seems relatively simple to comprehend. The number of ecotourism sites in close proximity to restoration sites is proportionately high, leading to the potential for ecotourist aid at nearby restoration project areas. However, proximity is not the only factor relating to feasibility measurements in the Chesapeake Bay. A number of stakeholders, including restoration project managers, ecotourism location owners and operators, and associated funding suppliers, have the potential to limit coordination efforts between ecotourism and ecological restoration work in the Chesapeake Bay.

Ecotourism-restoration coordination efforts in the Chesapeake Bay will need to be explored in terms of available staff and resources, as well as public interest in the restoration effort. In order to ensure a successful coordination program and analysis of

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[138] A.M. Nowaczek, C.M. Moran-Cahusac and D.A. Fennell, "Against the Current: Striving for Ethical Ecotourism," in *Critical Issues in Ecotourism: Understanding a Complex Tourism Phenomenon*, edited by J. Higham, 136-157, Burlington, MA: Elsevier Ltd. (2007), 148.

public response should be taken into consideration. Potential methodology for collecting and analyzing this public response will be further discussed in Chapter 6.

Provided public interest in a local ecotourism-restoration coordination program, education outreach regarding the local restoration sites will begin with teaching activity at the ecotourism site. As previously noted, this will result in the ecotourism staff needing an adequate knowledge base of the local area and restoration projects in order to be able to provide visitors with an educational experience. If necessary, staff will potentially need to be trained in regard to relevant information and teaching techniques. Unfortunately, training time and resources may be limited due to unavailable funding or personnel resources. However, given access to adequate funding and staff, an ecotourism-restoration cooperative becomes feasible.

5.5 Examining Specific Ecotourism-Restoration Relationships

Visual examination of the resulting spatial analysis buffers surrounding the mapped NOAA ecological restoration sites within the Maryland-Virginia portion of the Chesapeake Bay watershed indicates a number of ecotourism-restoration relationship clusters. Through comparing the buffer map (Map 5.5) to the spatial reference base map of ecotourism and ecological restoration sites in the Chesapeake Bay (Map 5.4), these clusters appear to coincide with certain city-areas. While buffer distances of 5, 10 and 15 miles were generated for this study, relationships within visible cluster areas showed a density even within the 5 mile buffer area. Thus, for simplification purposes only ecotourism and restoration sites within the 5 mile buffer area will be presented. Four of these ecotourism-restoration cluster relationships will be examined in further detail: Baltimore, MD; Annapolis, MD; Solomons, MD; and Norfolk, VA.

5.5.1 *Baltimore, Maryland*

As Maryland's largest city and economic hub,[139] Baltimore serves a diverse population of residents and visitors. In 2008, Baltimore hosted 11.39 million domestic visitors in addition to 5.31 million day-trip visitors from within 50 miles of the city region. General tourism in Baltimore accounts for over 78,000 jobs in the region, over

[139] Visit Baltimore, "About Us: Baltimore, a bustling city built on tradition and civic pride, is an American success story," *Visit Baltimore,* 2010, http://baltimore.org/about-baltimore (22 April 2010).

70% of which are a direct result of tourism, yielding $2.49 billion in employee wages.[140] Given these figures, it is logical to examine Baltimore as one of the ecotourism-restoration cluster cities resulting from the spatial analysis of ecological restoration buffer areas in the Bay.

Upon closer analysis of the Baltimore cluster area, three NOAA restoration sites are presented:

- Community-Based Marine Debris Prevention and Removal in Baltimore, MD
- Fort McHenry Wetlands Restoration
- Patapsco River Living Shoreline Project.

"Community-Based Marine Debris Prevention and Removal in Baltimore, MD" is listed as a marine debris restoration project. "Fort McHenry Wetlands Restoration" is listed as a community-based restoration project. Both the "Community-Based Marine Debris Prevention and Removal in Baltimore, MD" and the "Fort McHenry Wetlands Restoration" projects have completed implementation. Alternatively the community-based restoration "Patapsco River Living Shoreline Project" has been terminated.

In addition, a number of Chesapeake Bay Gateways Network partners are located within the five mile buffer areas surrounding the three restoration sites listed:

- Baltimore Visitor Center
- Fells Point Historic District
- Fells Point Maritime Museum
- Fort McHenry National Monument and Historic Shrine
- Frederick Douglas-Isaac Myers Maritime Park
- Lightship Chesapeake & 7 Foot Knoll Lighthouse
- Jones Fall Trail
- National Aquarium in Baltimore
- Pride of Baltimore II
- USS Constitution Museum.

[140] Visit Baltimore, "About Us," *Visit Baltimore*, 2010, http://baltimore.org/misc/uploads/mediapdfs/about%20us.pdf (22 April 2010).

These ecotourism sites range from information centers to city areas, leisure parks to land trails, and historical or nature-based sites.

As presented, Baltimore hosts the highest number of ecotourism operations in relation to restoration efforts of the four local areas explored. Given this proportion, it is likely that the ecotourism locations listed will collectively be able to aid in the wetland restoration and marine debris prevention and removal projects located in the Baltimore area.

5.5.2 *Annapolis, Maryland*

Annapolis, Maryland's capital city, is comprised of 7.2 square miles of land area in addition to 17 miles of Chesapeake Bay waterfront.[141] Access to this coast-line provides Annapolis with the opportunity to utilize a number of Bay resources through resident and visitor consumption and recreation. However, this consumption and recreation is likely to have resulted in a number of the ecological restoration project sites present in the observed Annapolis ecotourism-restoration cluster area.

Upon closer analysis of the Annapolis cluster area, a number of community-based, restoration projects have been identified:

- Almshouse Creek Living Shoreline Project
- Almshouse Creek Living Shorelines – Beach 5 Site
- Amos Garrett Park Shoreline Restoration Project
- Back Creek Nature Park Living Shorelines Project
- Chesapeake Bay Foundation Citizen Oyster Gardening Program
- Chesapeake Bay SAV Restoration:
  Baywide Coordination and Technology Transfer
- Hidden Pond Restoration Project
- Mill Creek Tributary at Dull's Corner
- Oyster Recovery Partnership Restoration-Severn River
- Severn River Oyster Restoration
- South River Oyster and SAV Restoration

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[141] Government of the City of Annapolis, "General Demographic Information," *City of Annapolis*, 2002, http://www.ci.annapolis.md.us/info.asp?page=7266 (22 April 2010).

- St. Johns College Living Shoreline Restoration Project
- Truxtun Park Restoration.

With the exception of the “Almshouse Creek Living Shoreline-Beach 5 Site” and “Mill Creek Tributary at Dull’s Corner” projects, all projects have completed implementation. “Almshouse Creek Living Shorelines – Beach 5 Site” is currently in the implementation stage and “Mill Creek Tributary at Dull’s Corner” has been terminated.

In addition, four Chesapeake Bay Gateways Network ecotourism sites fall within the five mile buffer area of the Annapolis-area restoration sites:

- Annapolis and Anne Arundel Co. Information Center
- Historic Annapolis Gateway-City Dock
- Historic London Town and Garden
- Sandy Point State Park.

Similar to the city of Baltimore, the ecotourism locations mapped in close proximity to Annapolis restoration sites represent a variety of CBGN gateway types including an information center, city area, and park.

However, the relationship between ecological restoration efforts and ecotourism operation in Annapolis is proportionately different from the relationship explored in Baltimore. Restoration efforts in the Annapolis area outweigh mapped ecotourism operations by more than three to one. In comparison to a more even, or even inversely, distributed proportion between these efforts, the opportunity for ecotourism operations to aid in local restoration initiatives decreases. With fewer ecotourism sites to work as coordination centers, it is likely that fewer ecotourist volunteers will be generated through advertisement and outreach efforts.

5.5.3 *Solomons, Maryland*

The town of Solomons is a coastal community built at the intersection of the Patuxant River and the Chesapeake Bay in Southern Maryland. Similar to other coastal communities along the Bay, including Annapolis, the location of the city provides almost immediate access to Bay resources and activities. However, as previously explored, this interaction between human development and its natural surroundings has created a strain on the environment resulting in the need for the establishment of local restoration activity.

Upon closer analysis of the Solomons cluster area, six community-based projects are presented:

- Jefferson Patterson Park Living Shorelines Outreach Project
- Maryland/Virginia Oyster Reef Restoration Projects – Patuxant River
- Patuxant River SAV Restoration
- Patuxant River Bay Grass and Oyster Restoration – Neale Addition Oyster Bar
- Patuxant River Bay Grass and Oyster Restoration – Jug Bay SAV
- Sandy Point Ecosystem Restoration Project.

All projects are specified as restoration efforts, with the exception of “Jefferson Patterson Park Living Shorelines Outreach Project” which is specified as an educational project. Additionally, all projects have completed implementation, with the exception of the terminated “Sandy Point Ecosystem Restoration Project.”

In addition, CBGN ecotourism locations presented include a variety of site types ranging from information centers to museums, and parks to educational facilities:

- Calvert Cliffs State Park
- Calvert Marine Museum
- Chesapeake Biological Laboratory, UMES
- Flags Pond Nature Park
- Greenwell State Park
- Jefferson Patterson Park and Museum
- Myrtle Point Park
- Scotterly Plantation
- Solomons Visitor Information Center.

Similar to the proportion of ecological restoration sites to ecotourism locations found in Baltimore, the coordination opportunity in Solomons is evidently present. However, almost half of the ecotourism sites presented represent park areas absent of formal staff. This factor has the potential to hinder the ability to utilize those sites as coordination centers.

5.5.4 *Norfolk, Virginia*

Housing over 237,000 residents and serving as "one of the busiest international ports on the East Coast of the United States," Norfolk, Virginia is situated on 7 miles of Bay beachfront with a total of 144 miles for shoreline including those along lakes and rivers, much of which runs through residential areas.[142] Given shoreline access to Bay resources, ecotourism-restoration activity in the Norfolk area defines the fourth cluster relationship to be explored in this study.

Upon closer analysis of the Norfolk cluster area, six community-based, implementation complete, restoration projects have been identified:

- Elizabeth River Oyster Reef Restoration
- Hermitage Foundation Living Shorelines Project
- Lafayette River Oyster Reef Restoration
- Maryland/Virginia Oyster Reef Restoration Projects-Elizabeth River
- Paradise Creek Oyster Reef Restoration
- Return to Paradise Creek.

Examining CBGN ecotourism locations in the Norfolk cluster yielded only three sites within the five mile buffers of the restoration areas:

- Elizabeth River Trail – Atlantic City Spur
- Hoffer Creek Wildlife Preserve
- Nauticus, National Maritime Center.

Although this discussion has been limited to ecotourism-restoration relationships within the dense 5- mile buffer areas, exploring the Norfolk cluster yielded a single outlying ecotourism location bordering the 5 and 10 mile buffer boundary:

- Great Bridge Lock Park.

Given this border effect, this site should also be considered while examining the ecotourism-restoration coordination possibility in the Norfolk area. However, similar to park areas identified in Solomons, MD, the absence of formal staff at this site can hinder the use of the site as a coordination center for ecotourism-restoration aid efforts.

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[142] City of Norfolk, "Fast Facts About Norfolk, Virginia," *The City of Norfolk,* 2010, http://www.norfolk.gov/about/FastFacts.asp (27 April 2010).

Chapter 6
Conclusions

6.1 Connecting Concepts

Through synthesizing a variety of definitions for the terms ecological restoration and ecotourism, what each term means and how they differ from similar operations becomes better understood. Without a synthesized understanding of the terms, uncertainty of how to distinguish a genuinely successful operation, restoration- or ecotourism- based, from those that may be deemed successful based on a definition which has been derived to fit the relative project goals. This process allows for clearer awareness of restoration and ecotourism activity in a local area, thus leading to an understanding of their roles in that area through studying the effectiveness of ecotourism as an ecological restoration tool.

The exploration of ecotourism as an ecological restoration tool results in three primary understandings:

- First, although rooted in the economic-based general tourism practices, ecotourism activity helps to support the local environment and culture as an additional operational goal. This allows for a mutually beneficial relationship between the tourism practice and the natural world it has the potential to affect.
- Second, while restoration efforts should continue for the benefit of the natural world, it is rather unfair to assume its role as a continual solution to future human disturbance. Rather, restoration should be considered a solution only to the past and a teaching tool for the future.
- Finally, ecotourism has the potential to work with restoration efforts as a source of local area and environmental education, leading to the benefit of all stakeholders involved.

By using the Chesapeake Bay Watershed as a case study, the potential working relationship between ecotourism and ecological restoration activity becomes more evident. Spatial analysis of ecotourism and ecological restoration sites within the Bay indicates a majority of the ecotourism locations occurring in close proximity to the area's restoration projects.[143] Thus, the feasibility of using ecotourism as an aid to restoration within the Chesapeake Bay Watershed increases. While these findings are specific to the Chesapeake, the methodology employed can be transferred and applied to any geographic area. Future expansion of this study to another geographic area will only increase the overall understanding of this subject matter. New study areas will be able to understand the spatial relationship between the restoration and ecotourism activity in that area while also understanding the feasibility for ecotourism-restoration coordination efforts, if any should exist.

6.2 Case Study Expansion

6.2.1 *Alternative GIS Methodology*

In order to simplify spatial analysis, in addition to limited GIS-compatible data file access, distance buffers have been used to analyze ecotourism-ecological restoration cooperative opportunities in the Chesapeake Bay Watershed. In relation to this study, suitable road map layers were not available for mapping thus limiting the analysis methods available. However, given access to sufficient data necessary to the analysis, such as a road layout or locations of objects which might limit travel, a least cost measure of distance can be used to enhance this and future analyses.

Alternative to distance measure using buffers, near methodology can be applied through a measurement according to cost by performing a network analysis. Network analysis methodology accounts for cost in a variety of increments including time, operating cost per mile, or effort expended.[144] Three common network analysis issues include route selection, resource and territory allocation, and traffic modeling.[145] These three analysis types are presented in Table 6.1, indicating analysis type, application, and criteria. Individually or collectively, these network analyses can aid in the spatial reference understanding of ecotourism-ecological restoration cooperative opportunities in future study areas, as well as in the expansion of the Chesapeake Bay case study.

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[143] Of the mapped CBGN ecotourism sites, 47%, 63%, and 77% are located within 5, 10 and 15 miles of NOAA-supported ecological restoration locations, respectively.
[144] Mitchell, "The ESRI Guide to GIS Analysis," 118.
[145] P. Bolstad, *GIS Fundamentals: A First Text on Geographic Information Systems, 3rd edition,*. White Bear Lake, MN: Eider Press, 2008. 363.

Table 6.1: Alternative GIS network analysis methodology.		
Analysis Type	**Common Application**	**Analysis Criteria**
Route Selection	to find the least costly route that visits a number of connected features	• shortest route • quickest route • least-costly route • order in which features are visited
Resource and Territory Allocation	assigning a network area to one certain feature (allocation center) links all other features (non-allocation centers) to the nearest allocation center	• resource limit of territory • maximum distance to allocation center
Traffic Modeling	assessment of traffic patterns, and the associated cost, throughout a network travel area	• attributes defining travel speed and direction • attributes identifying turns and time or cost required for each turn

Table 6.1: Alternative GIS network analysis methodology including analysis type, application and criteria available for use in future ecotourism- ecological restoration cooperative analyses.[146]

Route selection analysis will allow for the selection of a "best" route to a feature location, accounting for distance, time and cost. Each portion of the route is assessed by cost, cumulatively adding the cost associated with each route portion selected. In this case, the least cost route will be selected. Additionally, if multiple locations are to be visited on a selected route, the order in which those locations are visited can also be taken into consideration in determining the best route in this analysis.[147]

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[146] Information derived from Bolstad, *GIS Fundamentals*, 363-367.
[147] Bolstad, *GIS Fundamentals*, 363-365.

The second type of network analysis, resource and territory allocation analysis, assesses the "network area" in relation to one feature, or allocation center.[148] In terms of ecotourism-restoration site analysis, the restoration site can serve as the allocation center in question, linking all ecotourism locations within a defined maximum distance to that center location. In addition, a resource limit, or capacity can be associated with the allocation center. For instance, an ecological restoration site can determine a maximum capacity of ecotourism participants thus limiting the network, or number of ecotourism sites, which will be able to provide ecotourists to those restoration sites.

A third method of network analysis which can be applied to ecotourism-ecological restoration relationship analyses involves traffic modeling. Traffic modeling defines attributes associated with certain route areas, including travel speed and direction, turns and the time or cost of each turn.[149] As a compliment to route selection and resource or territory allocation methods, traffic modeling can aid in the selection of a *true* best route selection accounting for routes which will minimize travel time between ecotourism locations and restoration sites, in turn potentially maximizing participation time at the restoration site.

6.2.2 *Measuring Public Response*

While the discussed GIS analyses can provide a measure of ecotourism-ecological restoration cooperation opportunity through determining travel cost due to distance, territory or traffic measurements, they are unable to account for visitor response to or desire for such cooperation. Ultimately, the opportunity for ecotourism locations to aid in local ecological restoration efforts relies on public interest, or demand, of the cooperation. Thus, survey administration and economic demand estimate methodology must be adopted in order to measure public response and determine demand for ecotourism-ecological restoration cooperative efforts in the Chesapeake Bay, and in future study areas.

Short surveys in relation to visitors' purposes for visiting and potential goals of the visit can be administered to visitors at the ecotourism locations. Administration and

[148] Bolstad, *GIS Fundamentals,* 365-366.
[149] Bolstad, *GIS Fundamentals,* 366-367.

analyses of these surveys can provide a general idea of visitor demand for and participation in ecotourism activity. Survey length should be kept short to keep the interest of visitors and maximize number of responses. Additionally, a multiple choice of qualitative answers might be provided to ensure answer consistency between visitor groups, eliminating the potential for over variation of open-ended questions when analyzing survey results.

Additionally, economic demand estimates can be generated to account for the ecotourist, or consumer, demand for participation in ecological restoration efforts. Two common demand estimates include the Clawson-Hotelling estimate of the demand for and value of a recreation resource, and the Rosen estimate of hedonic demand. The Clawson-Hotelling approach to estimating the demand for and value of a recreation resource requires "first estimating statistical demand functions for the total outdoor recreation experience and then deriving the implied demand for and value of the resource itself."[150] This is done by analyzing the relationship between travel costs and consumer participation in the activity.[151] Furthermore, assuming homogenous consumer groups surveyed, demand can be derived from this relationship.[152] Alternatively, Rosen's estimate of hedonic demand measures consumers' marginal willingness to pay for the good in question, also assuming homogenous consumer groups surveyed, allowing for a demand curve to be derived.[153]

The derivation of economic demand curves can be utilized in conjunction with the short survey analysis in order to understand public response of and demand for the cooperation effort between ecotourism activity and local ecological restoration effort. This response can then be used to facilitate an optimal ecotourism-ecological restoration cooperation opportunity at a specific area of interest.

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[150] R.L. Gum and W.E. Martin, "Problems and Solutions in Estimating the Demand for and Value of Rural Outdoor Recreation," *American Journal of Agricultural Economics* 57, no. 4 (1975): 558.
[151] W.G. Brown and F. Nawas, "Impact of Aggregation on the Estimation of Outdoor Recreation Demand Functions," *American Journal of Agricultural Economics* 55, no. 2 (1973): 246. *and*
R.F. Zeimer, W.N. Musser, and R.C. Hill, "Recreation Demand Equations: Functional Form and Consumer Surplus," *American Journal of Agricultural Economics* 62, no. 1 (1980): 136.
[152] Brown and Nawas, "Impact of Aggregation on the Estimation of Outdoor Recreation Demand Functions," 246.
[153] P.Bajari and C.L. Benkard, "Demand Estimation with Heterogeneous Consumers and Unobserved Product Characteristics: A Hedonic Approach," *Journal of Political Economy* 113, no. 6 (2005): 1240.

6.3 Future Application

The synthesized definitions of the terms ecological restoration and ecotourism have been formulated in order to be used in the assessment of the respective activities in any study area selected. Similarly, a simple spatial analysis of distance can be applied to any area for which restoration and ecotourism operation locations are provided. Study area should not be limited to coastal areas such as the Chesapeake Bay. Instead, a greater understanding of ecotourism-restoration coordination possibilities can be gained from studying a variety of geographical areas.

Ultimately, future studies remain highly dependent on the study area chosen and available resources from that area. However, future study should not be discouraged and even simple analyses can yield almost immediate correlations between ecological restoration efforts and surrounding ecotourism operations. As natural science restoration work interacts with the social science aspect of a tourism economy, the interdisciplinary nature of this study and its future implications will only help to further understand the link between humans and nature as they continue to interact and change in connection with one another.

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APPENDICES

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Fort McHenry Wetlands Restoration	Baltimore	MD	Community-based Restoration	Restoration	Implementation Complete	12/1/1998	5/1/2000
Patuxent River SAV Restoration	California	MD	Community-based Restoration	Restoration	Implementation Complete	9/23/1997	9/30/1998
Elizabeth River Oyster Reef Restoration	Portsmouth	VA	Community-based Restoration	Restoration	Implementation Complete	7/1/1998	7/15/1998
Lafayette River Oyster Reef Restoration	Norfolk	VA	Community-based Restoration	Restoration	Implementation Complete	7/1/1999	7/1/2000
St. Mary's River SAV Restoration, 2 sites	St. Mary's City	MD	Community-based Restoration	Restoration	Implementation Complete	9/1/1996	12/1/1997
Fort Carroll Oyster Reef Restoration	Baltimore	MD	Community-based Restoration	Restoration	Implementation Complete	6/1/1995	12/31/1999
Eastern Neck Saltmarsh Restoration & Monitoring	Rockhall	MD	Community-based Restoration	Restoration	Implementation Complete	4/1/2000	7/1/2000

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis.

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Bay Grasses in Classes - Maryland 2000	Denton	MD	Community-based Restoration	Educational	Implementation Complete	2/1/2000	3/5/2001
Delmarva Coastal Bay Oyster Sanctuary	near Ocean City	MD	Community-based Restoration	Restoration	Implementation Complete	3/1/2000	7/30/2004
Back Creek Eelgrass Restoration	Hampton	VA	Community-based Restoration	Restoration	Implementation Complete	10/14/2000	10/18/2000
Ocean City Reef Restoration	Ocean City	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2000	9/30/2001
Langley Oyster Restoration	Hampton	VA	Community-based Restoration	Restoration	Implementation Complete	9/1/2000	8/30/2001
Maryland/Virginia Oyster Reef Restoration Projects - Patuxent River	Solomons	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/1999	6/30/2000
Nanticoke River Oyster Project	Nanticoke	MD	Community-based Restoration	Restoration	Implementation Complete	2/1/2001	9/30/2001

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.

Project Name	City	State	Project Program	Project Type	Project Status	Implementation Start Date	Implementation End Date
Barren Island Tidal Wetland Restoration	Barren Island	MD	Community-based Restoration	Restoration	Implementation Complete	6/4/2001	9/30/2005
Maryland/Virginia Oyster Reef Restoration Projects - Elizabeth River	Portsmouth	VA	Community-based Restoration	Restoration	Implementation Complete	9/1/1999	7/30/2000
Anacostia Floodplain Habitat Restoration	College Park	MD	Community-based Restoration	Restoration	Implementation Complete	4/7/2001	7/3/2002
Chino Farms Fish Passage Restoration	Chestertown	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2000	7/31/2002
Hidden Pond Restoration Project	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	8/1/2001	10/31/2003
Horsehead Wetlands Center Habitat Restoration	Grasonville	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2000	9/1/2002

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.

Project Name	City	State	Project Program	Project Type	Project Status	Implementation Start Date	Implementation End Date
Lynnhaven River Oyster Restoration	Virginia Beach	VA	Community-based Restoration	Restoration	Implementation Complete	10/1/2001	9/30/2002
Oyster Recovery Partnership Restoration - Severn River	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	3/1/2001	11/30/2001
Patuxent River Bay Grass and Oyster Restoration - Neale Addition Oyster Bar	Hollywood	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2001	6/30/2002
Shirley Plantation SAV Restoration	Charles City	VA	Community-based Restoration	Restoration	Implementation Complete	9/1/2002	3/1/2003
Virginia Bay Oyster Reef and SAV Restoration		VA	Community-based Restoration	Restoration	Implementation Complete	10/1/2001	9/30/2002
Bellevue Marsh Creation and Shoreline Restoration	Bellevue	MD	Community-based Restoration	Restoration	Implementation Complete	5/1/2001	6/30/2002

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Assateague Channel Oyster Reef Restoration	Chincoteague	VA	Community-based Restoration	Restoration	Implementation Complete	4/1/2002	10/1/2002
Chincoteague Bay Shellfish Restoration	Pocomoke	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2002	3/31/2004
US Navy Webster Field Restoration	St. Inigoes	MD	Community-based Restoration	Restoration	Implementation Complete	5/1/2003	9/1/2004
Northumberland Marshgrass Planting Project	Heathsville	VA	Community-based Restoration	Restoration	Implementation Complete	4/1/2002	9/30/2003
Westmoreland Oyster Heritage Program	Kinsale	VA	Community-based Restoration	Restoration	Implementation Complete	3/15/2003	6/15/2005
Upper Bay Reef Sanctuary	Rock Hall	MD	Community-based Restoration	Restoration	Implementation Complete	6/1/2002	12/31/2003
Eastern Neck Wetland Restoration	Queenstown	MD	Community-based Restoration	Restoration	Implementation Complete	4/15/2002	4/14/2003
Truxtun Park Restoration	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	5/1/2002	6/30/2003

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Smith Island Center Education	Ewell	MD	Community-based Restoration	Restoration	Implementation Complete	5/1/2002	4/1/2003
Lower Nanticoke SAV Restoration	Cambridge	MD	Community-based Restoration	Restoration	Implementation Complete	6/2/2002	4/22/2005
Return to Paradise Creek	Chesapeake	VA	Community-based Restoration	Restoration	Implementation Complete	3/1/2003	2/29/2004
Octoraro Fish Passage	Rising Sun	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2002	9/30/2005
Woolen Mills Dam (VA) Removal Analysis	Charlottesville	VA	Community-based Restoration	Planning and Assessment	Implementation Complete	10/1/2002	1/20/2005
Anacostia Floodplain Habitat Restoration - Phase II	College Park	MD	Community-based Restoration	Restoration	Implementation Complete	5/20/2002	5/19/2003
Chesapeake Bay Mini Oyster Reef Project - Miles River	Saint Michaels	MD	Community-based Restoration	Restoration	Implementation Complete	9/30/2002	11/6/2004

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Cobb Island Bay SAV Restoration	Virginia Beach	VA	Community-based Restoration	Restoration	Implementation Complete	1/1/2003	10/30/2003
South River Oyster and SAV Restoration	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2002	9/30/2004
Restoration of Mesohaline SAV Through Community-based Projects in the Chesapeake Bay	Centreville	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2003	10/31/2005
Chesapeake Bay SAV Restoration: Baywide Coordination and Technology Transfer	Annapolis	MD	Community-based Restoration	Planning and Assessment	Implementation Complete	4/1/2004	9/30/2004
Chesapeake Bay Foundation Citizen Oyster Gardening Program	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	4/1/2003	6/30/2004

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Central Rappahannock Spawning Habitat Restoration Project	Stafford	VA	Community-based Restoration	Restoration	Implementation Complete	6/1/2003	9/30/2004
Foxwells Wetland Restoration	Foxwells	VA	Community-based Restoration	Restoration	Implementation Complete	6/15/2003	6/30/2004
Delmarva Coastal Wetland Restoration	Vienna	MD	Community-based Restoration	Restoration	Implementation Complete	3/1/2006	11/30/2006
VIrginia Eastern Shore SAV Restoration	Wachapreague	VA	Community-based Restoration	Restoration	Implementation Complete	5/1/2003	10/31/2004
Turner Station Turning Points Project	Baltimore	MD	Community-based Restoration	Restoration	Implementation Complete	8/1/2003	5/31/2004
Chester River Wetlands Project	Chester	MD	Community-based Restoration	Restoration	Implementation Complete	4/1/2003	9/16/2004
Paradise Creek Oyster Reef Restoration	Chesapeake	VA	Community-based Restoration	Restoration	Implementation Complete	5/22/2004	10/15/2004

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.

Project Name	City	State	Project Program	Project Type	Project Status	Implementation Start Date	Implementation End Date
Chalk Point Oil Spill - Kitts Marsh Oyster Sanctuary	Adelina	MD	DARRP	Restoration	Implementation Complete	8/15/2003	8/31/2007
Chalk Point Oil Spill - Marsh/Beach Project	Trent Hall	MD	DARRP	Restoration	Implementation Complete	6/1/2005	9/30/2005
Salisbury Shoreline Restoration Project	Salisbury	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2006	5/31/2007
Chesapeake Bay Mini Oyster Reef Project - Magothy River	Cape St. Claire	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2002	8/20/2003
Chesapeake Bay Mini Oyster Reefs Project - 5 sites	Eastport	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2002	10/12/2004
Oyster Recovery Partnership Restoration - Patuxent River	Benedict	MD	Community-based Restoration	Restoration	Implementation Complete	3/1/2001	11/30/2001

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Oyster Recovery Partnership Restoration - Choptank River	Cambridge	MD	Community-based Restoration	Restoration	Implementation Complete	3/1/2001	11/30/2001
Patuxent River Bay Grass and Oyster Restoration - Jug Bay SAV Restoration	Hollywood	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2001	6/30/2002
Harrisonburg Dam Removal	Harrisonburg	VA	Community-based Restoration	Restoration	Implementation Complete	6/1/2004	10/31/2004
Horsehead Wetland Restoration Phase II	Grasonville	MD	Community-based Restoration	Restoration	Implementation Complete	3/1/2004	6/15/2004
Chesapeake Bay Mini Oyster Reef Project - Kent Island	Kent Island	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2002	9/25/2003
Oyster Recovery Partnership Restoration - Magothy River	Lake Shore	MD	Community-based Restoration	Restoration	Implementation Complete	3/1/2001	11/30/2001

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
South River Living Shoreline Project	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	9/1/2004	3/31/2007
Amos Garrett Park Shoreline Restoration Project	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	4/1/2004	8/31/2004
Northumberland Marshgrass Planting Project 2004	Lewisetta	VA	Community-based Restoration	Restoration	Implementation Complete	10/1/2003	7/26/2004
Sandy Point Ecosystem Restoration Project	Solomons	MD	Community-based Restoration	Restoration	Project Terminated		
Patapsco River Living Shoreline Project	Baltimore	MD	Community-based Restoration	Restoration	Project Terminated		
Hollicutt's Noose Reefball/Oyster Reef Restoration	Grasonville	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2006	10/31/2007
Chesapeake Bay Underwater Grasses Research Study	Grasonville	MD	Community-based Restoration	Restoration	Implementation Stage	8/1/2004	

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Pocomoke City Restoration	Pocomoke City	MD	Community-based Restoration	Restoration	Project Terminated	6/1/2004	
Havre de Grace Restoration	Havre de Grace	MD	Community-based Restoration	Restoration	Implementation Complete	9/1/2004	8/30/2005
Pickering Creek Buffer Restoration	Easton	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2004	7/31/2007
Rhode River Oyster Restoration	Mayo	MD	Community-based Restoration	Restoration	Implementation Complete	11/1/2004	4/30/2005
West and Rhode River Oyster Restoration	Galesville	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2006	8/31/2007
St. Mary's River Living Shorelines Project	St. Mary's City	MD	Community-based Restoration	Restoration	Implementation Complete	6/1/2005	9/25/2007
Hermitage Foundation Living Shorelines Project	Norfolk	VA	Community-based Restoration	Restoration	Implementation Complete	12/1/2005	5/31/2006
Barren Island Tidal Wetland Restoration Phase 2	Barren Island	MD	Community-based Restoration	Restoration	Implementation Complete	7/1/2005	10/1/2005

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Back Creek Nature Park Living Shorelines Project	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	5/1/2005	9/30/2005
Living Shoreline Wave Attenuation Study	Cambridge	MD	Community-based Restoration	Research	Implementation Stage	7/1/2005	
Jefferson Patterson Park Living Shorelines Outreach Project	St. Leonard	MD	Community-based Restoration	Educational	Implementation Complete	6/1/2005	12/30/2005
US Navy Webster Field Restoration Phase II	St. Inigoes	MD	Community-based Restoration	Restoration	Implementation Complete	6/14/2005	6/14/2005
Pittsburgh Plate & Glass (PPG) Dam Removal	Cumberland	MD	Community-based Restoration	Restoration	Implementation Complete	9/1/2006	11/1/2007
Chesapeake Bay Foundation Oyster Restoration Activities - MD	Shady Side	MD	Community-based Restoration	Restoration	Implementation Complete	5/1/2004	9/30/2005
Mill Creek Tributary at Dull's Corner	Annapolis	MD	Community-based Restoration	Restoration	Project Terminated	7/15/2005	

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
West River Center Living Shorelines Project	West River	MD	Community-based Restoration	Restoration	Implementation Complete	10/15/2005	7/31/2007
Sharptown Living Shorelines Project	Sharptown	MD	Community-based Restoration	Engineering and Design	Implementation Complete	1/1/2006	6/29/2007
St. John's College Living Shoreline Restoration Project	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2005	8/15/2006
San Domingo Creek Living Shoreline Project	Saint Michaels	MD	Community-based Restoration	Restoration	Implementation Complete	10/1/2005	7/31/2007
Piscataway Park Living Shorelines Project	Accokeek	MD	Community-based Restoration	Engineering and Design	Implementation Complete	2/1/2006	5/31/2007
Cape Charles Town Beach Living Shoreline Project	Cape Charles	VA	Community-based Restoration	Restoration	Implementation Complete	3/22/2006	3/22/2007
Queen's Landing Living Shoreline Project	Chester	MD	Community-based Restoration	Restoration	Implementation Stage	2/1/2006	

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.

Project Name	City	State	Project Program	Project Type	Project Status	Implementation Start Date	Implementation End Date
Living Shorelines Research Project	Cambridge	MD	Community-based Restoration	Research	Implementation Stage	1/1/2006	
Severn River Oyster Restoration	Annapolis	MD	Community-based Restoration	Restoration	Implementation Complete	9/26/2005	4/30/2006
Community-Based Marine Debris Prevention and Removal in Baltimore, Maryland	Baltimore	MD	Marine Debris	Restoration	Implementation Complete	7/1/2006	12/31/2007
Trash Free Potomac Watershed Initiative		MD	Marine Debris	Restoration	Implementation Stage	10/1/2006	
Chalk Point Marsh and Beach Restoration - NOAA Restoration Day Activities	Benedict	MD	DARRP	Restoration	Implementation Complete	6/13/2006	6/13/2006
Blackwater River Stewart's Canal Project	Cambridge	MD	Community-based Restoration	Restoration	Implementation Complete	4/1/2006	2/28/2007

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.

Project Name	City	State	Project Program	Project Type	Project Status	Implementation Start Date	Implementation End Date
Almshouse Creek Living Shoreline Project	Edgewater	MD	Community-based Restoration	Restoration	Implementation Complete	3/16/2006	6/3/2007
Spaniards Point Living Shoreline Project	Centreville	MD	Community-based Restoration	Engineering and Design	Implementation Stage	1/22/2007	
Northeast Branch Anacostia Fish Passage	Beltsville	MD	Community-based Restoration	Restoration	Implementation Complete	12/1/2005	4/30/2007
Almshouse Creek Living Shorelines - Beach 5 Site	Edgewater	MD	Community-based Restoration	Restoration	Implementation Stage	8/9/2007	
Eastern Neck Wetland Creation and Monitoring	Queenstown	MD	Community-based Restoration	Restoration	Implementation Stage	6/1/2007	
Hull Springs Farm Living Shoreline Project	Kinsale	VA	Community-based Restoration	Restoration	Implementation Complete	8/1/2008	8/31/2009
Marine Debris Prevention and Removal in the Chesapeake and Maryland Coastal Bays	Baltimore	MD	Marine Debris	Restoration	Planning Stage	6/6/2007	

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis. **(Continued)**

Appendix 1: NOAA ecological restoration project locations plotted using ArcGIS v9.3 for spatial analysis.							
Project Name	**City**	**State**	**Project Program**	**Project Type**	**Project Status**	**Implementation Start Date**	**Implementation End Date**
Turners Creek (Sassafras River) Living Shoreline Project		MD	Community-based Restoration	Restoration	Implementation Stage	12/1/2006	
Trinity Church Living Shoreline Project	Church Creek	MD	Community-based Restoration	Restoration	Implementation Complete	12/1/2006	6/21/2008
Simkins Dam Removal Project	Woodlawn	MD	Community-based Restoration	Engineering and Design	Implementation Stage	4/1/2008	
Adaptive Approach to Enhance Eastern Oyster in the Piankatank River of Chesapeake Bay, VA	Deltaville	VA	Community-based Restoration	Restoration	Implementation Complete	4/1/2006	12/31/2007
Lynnhaven River Oyster Reef Restoration	Virginia Beach	VA	Community-based Restoration	Restoration	Implementation Complete	8/1/2006	5/31/2008

Appendix 1: Maryland-Virginia NOAA ecological restoration project locations clipped from complete Chesapeake Bay NOAA restoration project locations and plotted using ArcGIS v9.3 for spatial analysis.

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Adkins Arboretum	12610 Eveland Road	Ridgely	MD	21660	Gateway Site
Anacostia Community Park	First Street and Potomac Ave SE	Washington	DC	20003	Gateway Site
Anacostia Park	1900 Anacostia Drive SE	Washington	DC	20020	Gateway Site
Annapolis and Anne Arundel Co. Information Center	26 West Street	Annapolis	MD	21403	Gateway Regional Info Center or Hub
Annapolis Maritime Museum	133 Bay Shore Drive	Annapolis	MD	21403	Gateway Site
Balitmore Visitor Center	401 Light Street	Baltimore	MD	21201	Gateway Regional Info Center or Hub
Baltimore and Annapolis Trail	51 West Earleigh Heights Road	Severna Park	MD	21146	Gateway Land Trail
Battle Creek Cypress Swamp	2880 Gray Road	Prince Frederick	MD	20678	Gateway Site
Belle Isle State Park	1632 Belle Isle Road	Lancaster	VA	22503	Gateway Site
Blackwater National Wildlife Refuge	2431 Key Wallace Drive	Cambridge	MD	21613	Gateway Site
Bladensburg Waterfront Park	4601 Annapolis Road	Bladensburg	MD	20710	Gateway Site
C&O Canal National Historic Park (HQ)	1850 Duel Hwy	Hagerstown	MD	21740	Gateway Site
Caledon Natural Area	11617 Caledon Road	King George	VA	22485	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed.

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Calvert Cliffs State Park	9500 H.G. Truman Hwy	Lusby	MD	20657	Gateway Site
Calvert Marine Museum	14200 Solomons Island Road	Solomons	MD	20688	Gateway Site
Cape Charles Historic District		Cape Charles	VA	23310	Gateway Site
Captain Salem Avery House Museum	1418 EW Shady Side Road	Shady Side	MD	20764	Gateway Site
Chemung Basin River Trail	5 W Market Street	Corning	NY	14830	Gateway Water Trail
Chesapeake Bay Center (at First Landing State Park)	2500 Shore Drive	Virginia Beach	VA	23451	Gateway Regional Info Center or Hub
Chesapeake Bay Environmental Center	600 Discovery Lane	Grasonville	MD	21638	Gateway Site
Chesapeake Bay Maritime Museum	Navy Point	St. Michaels	MD	21663	Gateway Regional Info Center or Hub
Chesapeake Bay Railway Museum	4155 Mears Ave	Chesapeake Beach	MD	20732	Gateway Site
Chesapeake Biological Laboratory, UMCES	1 Williams Street	Solomons	MD	20688	Gateway Site
Chesapeake Exploration Center	425 Piney Narrows Road	Chester	MD	21619	Gateway Regional Info Center or Hub

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Chickahominy Riverfront Park	1350 John Tyler Hwy	Williamsburg	VA	23185	Gateway Site
Chippokes Plantation State Park	695 Chippokes Park Road	Surry	VA	23883	Gateway Site
Choptank & Tuckahoe Rivers Water Trail	10215 River Landing Road	Denton	MD	21629	Gateway Water Trail
Concord Point Lighthouse	Concord and Lafayette Street	Havre de Grace	MD	21078	Gateway Site
Cross Island Trail		Centreville	MD	21617	Gateway Land Trail
Dogwood Harbor, At Tilghman Island		Tilghman Island	MD	21671	Gateway Site
Dutch Gap Conservation Area	411 Coxendale Road	Chesterfield	VA	23832	Gateway Site
Eastern Branch Elizabeth Water Trail		Virginia Beach	VA	23450	Gateway Water Trail
Eastern Neck State Park	1730 Eastern Neck Road	Rock Hall	MD	21661	Gateway Site
Eastern Shore of Virgina National Wildlife Refuge	5003 Hallett Circle	Cape Charles	VA	23310	Gateway Site
Elizabeth River Trail - Atlantic City Spur	508 City Hall Building	Norfolk	VA	23510	Gateway Land Trail
Elk Neck State Park	4395 Turkey Point Road	North East	MD	21901	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Fells Point Historic District	812 S. Ann Street	Baltimore	MD	21231	Gateway Site
Fells Point Maritime Museum	1724 Thames Street	Baltimore	MD	21231	Gateway Site
First Landing State Park	2500 Shore Drive	Virginia Beach	VA	23451	Gateway Site
Flag Ponds Nature Park	1525 Flags Pond Parkway	Lusby	MD	20675	Gateway Site
Fort McHenry National Monument and Historic Shrine	E. Fort Avenue	Baltimore	MD	21230	Gateway Site
Fort Washington Park	13551 Fort Washington Road	Fort Washington	MD	20744	Gateway Site
Frederick Douglas-Isaac Myers Maritime Park	1417 Thames Street	Baltimore	MD	21231	Gateway Site
Galesville Heritage Society Museum	988 Main Street	Galesville	MD	20765	Gateway Site
Geddes-Piper House	101 Church Alley	Chestertown	MD	21620	Gateway Site
George Washington Birthplace NM	1732 Popes Creek Road	Washington Birthplace	VA	22333	Gateway Site
Gloucester Point Park	1255 Greate Road	Gloucester Point	VA	23062	Gateway Site
Great Bridge Lock Park	112 Mann Drive	Chesapeake	VA	23322	Gateway Site
Great Falls Park	9200 Old Dominion Drive	McLean	VA	22101	Gateway Site
Greenwell State Park	25420 Rosedale Manor Lane	Hollywood	MD	20636	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Gunpowder Falls State Park	2813 Jerusalem Road	Kingsville	MD	21087	Gateway Site
Gwynns Falls Trail and Greenway	1920 Eagle Drive	Baltimore	MD	21207	Gateway Land Trail
Havre de Grace Decoy Museum	215 Giles Street	Havre de Grace	MD	21078	Gateway Site
Headwaters River Trail	78 Front Street	Owego	NY	13827	Gateway Water Trail
Historic Annapolis Gateway-City Dock	Dock Street	Annapolis	MD	21401	Gateway Site
Historic London Town and Garden	839 Londontown Road	Edgewater	MD	21037	Gateway Site
Historic St. Mary's City	Off Route 5	St. Mary's City	MD	20686	Gateway Site
Hoffler Creek Wildlife Preserve	5410 Twin Pines Road	Portsmouth	VA	23703	Gateway Site
Huntley Meadows Park	3701 Lockheed Blvd	Alexandria	VA	22306	Gateway Site
J. Millard Tawes Museum & Ward Bros. Workshop	3 ninth Street	Crisfield	MD	21817	Gateway Site
James Mills Scottish Factor Store	Virgina Street	Urbanna	VA	23175	Gateway Site
Jamestown Island	W Terminus of the Colonial Pkwy	Jamestown	VA	23081	Gateway Site
Janes Island State Park	26280 Alfred Lawson Dr.	Crisfield	MD	21817	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Jefferson Patterson Park and Museum	10515 Mackall Road	St. Leonard	MD	20685	Gateway Site
Jones Falls Trail		Baltimore	MD	21201	Gateway Land Trail
Juniata Water Trail	702 W Pitt Street, Suite 8	Bedford	PA	15522	Gateway Water Trail
Kings Landing Park	3255 Kings Landing Road	Huntingtown	MD	20639	Gateway Site
Kiptopeke State Park	3540 Kiptopeke Drive	Cape Charles	VA	23310	Gateway Site
Lawrence Lewis, Jr. Park	12400/12508 Willcox Wharf Road	Charles City	VA	23020	Gateway Site
Leesylvania State Park	2001 Daniel K. Ludwig Drive	Woodbridge	VA	22191	Gateway Site
Lightship Chesapeake & 7 Foot Knoll Lighthouse	Pier 3&5 Pratt Street	Baltimore	MD	21202	Gateway Site
Lower James River Water Trail		Mechanicsville	VA	23111	Gateway Water Trail
Mariners' Museum	100 Museum Drive	Newport News	VA	23606	Gateway Site
Marshy Point Park	7130 Marshy Point Road	Baltimore	MD	21220	Gateway Site
Martinak State Park	137 Deep Shore Road	Denton	MD	21629	Gateway Site
Mason Neck State Park	7301 High Point Road	Lorton	VA	22079	Gateway Site
Mason Neck Wildlife Refuge	High Point Road	Lorton	VA	22079	Gateway Site
Matthews Blueways Water Trail		Matthews	VA	23109	Gateway Water Trail

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Matthews Co. Visitors and Information Center	12 Chursch Street	Matthews	VA	23109	Gateway Regional Info Center or Hub
Mattoponi & Pamaunkey Water Trail		Walkerton	VA	23177	Gateway Water Trail
Maury River Water Trail	150 South Main Street	Lexington	VA	24450	Gateway Water Trail
Merkle Wildlife Sanctuary	11704 Fenno Road	Upper Marlboro	MD	20772	Gateway Site
Monocacy River Water Trail	47 South Carroll Street	Frederick	MD	21705	Gateway Water Trail
Mount Harmon Plantation	600 Mount Harmon Road	Earleville	MD	21919	Gateway Site
Myrtle Point Park	24032-24069 N. Patuxent Beach Road	California City	MD	20619	Gateway Site
Nassawango Creek Preserve-Furnace Town	3816 Old Furnace Road	Snow Hill	MD	21863	Gateway Site
Nathan of Dorchester	Long Wharf and High Street	Cambridge	MD	21613	Gateway Site
National Aquarium in Baltimore	Pier 3, 501 East Pratt Street	Baltimore	MD	21202	Gateway Site
Nauticus, National Maritime Center	1 Waterside Drive	Norfolk	VA	23510	Gateway Site
North Point State Park	9000 Bay Shore Road	Edgemere	MD	21219	Gateway Site
Occoquan Bay National Wildlife Refuge	14050 Dawson Beach Road	Woodbridge	VA	22191	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Occoquan Water Trail	5400 Ox Road	Fairfax Station	VA	22039	Gateway Water Trail
Pamunkey Indian Reservation		King William	VA	23086	Gateway Site
Parkers Creek (American Chestnut Land Trust)	Scientist Cliffs Road	Port Republic	MD	20676	Gateway Site
Patapsco Valley State Park	8020 Baltimore National Pike	Ellicott City	MD	21043	Gateway Site
Patuxent Research Refuge, Visitor Center	10901 Scarlet Tanager Loop	Laurel	MD	20708	Gateway Site
Patuxent River Park, Jug Bay Natural Area	16000 Croom Airport Road	Upper Marlboro	MD	20772	Gateway Site
Pemberton Historical Park	Pemberton Drive and Naticoke Road	Salisbury	MD	21801	Gateway Site
Pickering Creek Audubon Center	11450 Audubon Lane	Easton	MD	21601	Gateway Site
Piney Point Lighthouse Museum and Park	44720 Lighthouse Road	Piney Point	MD	20674	Gateway Site
Piscataway Park	3400 Bryan Point Road	Accokeek	MD	20607	Gateway Site
Pocomoke River State Forest&Park	3461 Worcester Hwy	Snow Hill	MD	21863	Gateway Site
Point Lookout State Park	1175 Point Lookout Road	Scotland	MD	20687	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Potomac Gateways Welcome Center	3540 James Madison Pkwy, Hwy 301	King George	VA	22485	Gateway Regional Info Center or Hub
Potomac River Water Trail (end)	1175 Point Lookout Road	Scotland	MD	20687	Gateway Water Trail
Powhatan Creek Blueway	1831 Jamestown Road	Williamsburg	VA	23185	Gateway Water Trail
Pride of Baltimore II	401 E. Pratt Street, Suite 222	Baltimore	MD	21202	Gateway Site
Rappahannock River Valley Nat. Wildlife Refuge	336 Wilna Road	Warsaw	VA	22572	Gateway Site
Rappahannock River Water Trail		Fredericksburg	VA	22404	Gateway Water Trail
Reedville Fishermen's Museum	504 Main Street	Reedville	VA	22539	Gateway Site
Richardson Maritime Museum	401 High Street	Cambridge	MD	21613	Gateway Site
Riverbend Park	8700 Potomac Hills Street	Great Falls	VA	22066	Gateway Site
Riviannna River Water Trail		Palmyra	VA	22963	Gateway Water Trail
Rock Creek Park	5200 Glover Road NW	Washington	DC	20015	Gateway Site
Sailwinds Visitor Center	2 Rose Hill Place	Cambridge	MD	21613	Gateway Regional Info Center or Hub
Sandy Point State Park	1100 East College Parkway	Annapolis	MD	21409	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Sassafrass NRMA & Turner's Creek Park	Turner's Creek Road	Kennedyville	MD	21645	Gateway Site
Schooner Sultana	Cannon Street Dock	Chestertown	MD	21620	Gateway Site
Scotterly Plantation	44300 Scotterly Lane	Hollywood	MD	20636	Gateway Site
Sesquehanna Museum at Havre de Grace	817 Conesteo Street	Havre de Grace	MD	21078	Gateway Site
Sesquehanna River Water Trail (mid)		Harrisburg	PA	17101	Gateway Water Trail
Sesquehanna River Water Trail (west)	651 Montmorenci Road	Ridgeway	PA	15853	Gateway Water Trail
Sesquehanna State Park	3318 Rocks Chrome Hill Road	Jarrettsville	MD	21084	Gateway Site
Shenandoah River State Park	350 Daughter of Stars Drive	Bentonville	VA	22610	Gateway Site
Smallwood State Park	2750 Sweeden Point Road	Marbury	MD	20658	Gateway Site
Smith Island Center	12806 Caleb Jones Road	Ewell	MD	21824	Gateway Site
Smithsonian Environmental Research Center	647 Contees Wharf Road	Edgewater	MD	21037	Gateway Site
Solomons Visitor Information Center	14175 Solomons Island Road	Solomons	MD	20688	Gateway Regional Info Center or Hub
Spruce Knob-Seneca Rocks National Recreation Area	Hwy 28 and Hwy 33	Seneca Rocks	WV	26884	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
St. Clement's Island Potomac River Museum	38370 Point Breeze Road	Colton's Point	MD	20626	Gateway Site
Steamboat Era Museum	156 King Carter Drive	Irvington	VA	22480	Gateway Site
Stratford Hall Plantation	483 Great House Road	Stratford	VA	22558	Gateway Site
Sturgis Memorial Gateway	River and Washington Street	Snow Hill	MD	21863	Gateway Site
Swatara Creek Water Trail	2501 Cumberland Street	Lebanon	PA	17402	Gateway Water Trail
Terrapin Park	191 Log Canoe Circle	Stevensville	MD	21666	Gateway Site
Underground Railroad Scenic Byway (Driving Route)	2 Rose Hill Place	Cambridge	MD	21613	Gateway Land Trail
USS Constitution Museum	301 E. Pratt Street	Baltimore	MD	21202	Gateway Site
Virginia Eastern Shore Water Trails	22545 Center Parkway	Accomac	VA	23301	Gateway Water Trail
Virginia Living Museum	524 J. Clyde Morris Blvd	Newport News	VA	23601	Gateway Site
Ward Museum of Wildfowl Art	909 S. Schumaker Drive	Salisbury	MD	21804	Gateway Site
Washington Ferry Farm	268 Kings Hwy	Fredericksburg	VA	22405	Gateway Site
Watermen's Museum	309 Water Street	Yorktown	VA	23690	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed. **(Continued)**

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted for spatial analysis.					
NAME	**ADDRESS**	**CITY**	**STATE**	**ZIP**	**GATEWAY TYPE**
Westmoreland State Park	1650 State Park Road	Montross	VA	22520	Gateway Site
Wharves at Choptank Crossing	12019 Riverlanding Road	Denton	MD	21629	Gateway Site
Wye Grist Mill	14296 Old Wye Mills Road	Wye Mills	MD	21679	Gateway Site
Wye Island Natural Resource Management Area	632 Wye Island Road	Queenstown	MD	21658	Gateway Site
York River State Park	5526 Riverview Road	Williamsburg	VA	23188	Gateway Site
Yorktown Visitor Center and Battlefield	Eastern Terminus, Colonial Pkwy	Yorktown	VA	23690	Gateway Site

Appendix 2: Chesapeake Bay Gateways Network ecotourism sites plotted using ArgGIS v9.3 for the spatial analysis of ecotourism-ecological restoration collaboration opportunities within the Chesapeake Bay Watershed.

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within 5 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Annapolis and Anne Arundel Co. Information Center	Gateway Regional Info Center or Hub	26 West Street	Annapolis	MD	21403
Balitmore Visitor Center	Gateway Regional Info Center or Hub	401 Light Street	Baltimore	MD	21201
Chesapeake Bay Center (at First Landing State Park)	Gateway Regional Info Center or Hub	2500 Shore Drive	Virginia Beach	VA	23451
Chesapeake Bay Maritime Museum	Gateway Regional Info Center or Hub	Navy Point	St. Michaels	MD	216630
Chesapeake Exploration Center	Gateway Regional Info Center or Hub	425 Piney Narrows Road	Chester	MD	21619
Sailwinds Visitor Center	Gateway Regional Info Center or Hub	2 Rose Hill Place	Cambridge	MD	21613
Solomons Visitor Information Center	Gateway Regional Info Center or Hub	14175 Solomons Island Road	Solomons	MD	20688
Anacostia Community Park	Gateway Site	First Street and Potomac Ave S.E.	Washington	DC	20003
Anacostia Park	Gateway Site	1900 Anacostia Drive S.E.	Washington	DC	20020
Annapolis Maritime Museum	Gateway Site	133 Bay Shore Drive	Annapolis	MD	21403

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within the 5 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3.

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within 5 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Battle Creek Cypress Swamp	Gateway Site	2880 Gray Road	Prince Frederick	MD	20678
Bladensburg Waterfront Park	Gateway Site	4601 Annapolis Road	Bladensburg	MD	20710
Calvert Cliffs State Park	Gateway Site	9500 H.G. Truman Hwy	Lusby	MD	20657
Calvert Marine Museum	Gateway Site	14200 Solomons Island Road	Solomons	MD	20688
Cape Charles Historic District	Gateway Site		Cape Charles	VA	23310
Captain Salem Avery House Museum	Gateway Site	1418 EW Shady Side Road	Shady Side	MD	20764
Chesapeake Bay Environmental Center	Gateway Site	600 Discovery Lane	Grasonville	MD	21638
Chesapeake Biological Laboratory, UMCES	Gateway Site	1 Williams Street	Solomons	MD	206880
Concord Point Lighthouse	Gateway Site	Concord and Lafayette Street	Havre de Grace	MD	210780
Eastern Neck State Park	Gateway Site	1730 Eastern Neck Road	Rock Hall	MD	21661
Fells Point Historic District	Gateway Site	812 S. Ann Street	Baltimore	MD	21231
Fells Point Maritime Museum	Gateway Site	1724 Thames Street	Baltimore	MD	21231
First Landing State Park	Gateway Site	2500 Shore Drive	Virginia Beach	VA	23451
Flag Ponds Nature Park	Gateway Site	1525 Flags Pond Parkway	Lusby	MD	206750

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within the 5 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within 5 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Fort McHenry National Monument and Historic Shrine	Gateway Site	E. Fort Avenue	Baltimore	MD	21230
Fort Washington Park	Gateway Site	13551 Fort Washington Road	Fort Washington	MD	20744
Frederick Douglas-Isaac Myers Maritime Park	Gateway Site	1417 Thames Street	Baltimore	MD	21231
Galesville Heritage Society Museum	Gateway Site	988 Main Street	Galesville	MD	20765
Greenwell State Park	Gateway Site	25420 Rosedale Manor Lane	Hollywood	MD	20636
Havre de Grace Decoy Museum	Gateway Site	215 Giles Street	Havre de Grace	MD	21078
Historic Annapolis Gateway-City Dock	Gateway Site	Dock Street	Annapolis	MD	21401
Historic London Town and Garden	Gateway Site	839 Londontown Road	Edgewater	MD	21037
Historic St. Mary's City	Gateway Site	Off Route 5	St. Mary's City	MD	206860
Hoffler Creek Wildlife Preserve	Gateway Site	5410 Twin Pines Road	Portsmouth	VA	23703
Huntley Meadows Park	Gateway Site	3701 Lockheed Blvd	Alexandria	VA	22306
Jefferson Patterson Park and Museum	Gateway Site	10515 Mackall Road	St. Leonard	MD	20685
Kings Landing Park	Gateway Site	3255 Kings Landing Road	Huntingtown	MD	20639

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within the 5 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within 5 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Lightship Chesapeake & 7 Foot Knoll Lighthouse	Gateway Site	Pier 3&5 Pratt Street	Baltimore	MD	21202
Martinak State Park	Gateway Site	137 Deep Shore Road	Denton	MD	21629
Mount Harmon Plantation	Gateway Site	600 Mount Harmon Road	Earleville	MD	21919
Myrtle Point Park	Gateway Site	24032-24069 N. Patuxent Beach Road	California City	MD	20619
Nathan of Dorchester	Gateway Site	Long Wharf and High Street	Cambridge	MD	21613
National Aquarium in Baltimore	Gateway Site	Pier 3, 501 East Pratt Street	Baltimore	MD	21202
Nauticus, National Maritime Center	Gateway Site	1 Waterside Drive	Norfolk	VA	23510
North Point State Park	Gateway Site	9000 Bay Shore Road	Edgemere	MD	21219
Patapsco Valley State Park	Gateway Site	8020 Baltimore National Pike	Ellicott City	MD	21043
Patuxent Research Refuge, Visitor Center	Gateway Site	10901 Scarlet Tanager Loop	Laurel	MD	20708
Pemberton Historical Park	Gateway Site	Pemberton Drive and Naticoke Road	Salisbury	MD	21801
Pickering Creek Audubon Center	Gateway Site	11450 Audubon Lane	Easton	MD	21601
Piney Point Lighthouse Museum and Park	Gateway Site	44720 Lighthouse Road	Piney Point	MD	20674

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within the 5 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within 5 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Piscataway Park	Gateway Site	3400 Bryan Point Road	Accokeek	MD	20607
Pride of Baltimore II	Gateway Site	401 E. Pratt Street, Suite 222	Baltimore	MD	21202
Richardson Maritime Museum	Gateway Site	401 High Street	Cambridge	MD	21613
Sandy Point State Park	Gateway Site	1100 East College Parkway	Annapolis	MD	21409
Sassafrass NRMA & Turner's Creek Park	Gateway Site	Turner's Creek Road	Kennedyville	MD	21645
Scotterly Plantation	Gateway Site	44300 Scotterly Lane	Hollywood	MD	20636
Sesquehanna Museum at Havre de Grace	Gateway Site	817 Conesteo Street	Havre de Grace	MD	21078
Smith Island Center	Gateway Site	12806 Caleb Jones Road	Ewell	MD	21824
Smithsonian Environmental Research Center	Gateway Site	647 Contees Wharf Road	Edgewater	MD	21037
Terrapin Park	Gateway Site	191 Log Canoe Circle	Stevensville	MD	21666
USS Constitution Museum	Gateway Site	301 E. Pratt Street	Baltimore	MD	21202
Ward Museum of Wildfowl Art	Gateway Site	909 S. Schumaker Drive	Salisbury	MD	21804
Wharves at Choptank Crossing	Gateway Site	12019 Riverlanding Road	Denton	MD	21629
Wye Grist Mill	Gateway Site	14296 Old Wye Mills Road	Wye Mills	MD	21679

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within the 5 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within 5 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Wye Island Natural Resource Management Area	Gateway Site	632 Wye Island Road	Queenstown	MD	21658
Baltimore and Annapolis Trail	Gateway Land Trail	51 West Earleigh Heights Road	Severna Park	MD	21146
Cross Island Trail	Gateway Land Trail		Centreville	MD	216170
Elizabeth River Trail - Atlantic City Spur	Gateway Land Trail	508 City Hall Building	Norfolk	VA	23510
Jones Falls Trail	Gateway Land Trail		Baltimore	MD	21201
Underground Railroad Scenic Byway (Driving Route)	Gateway Land Trail	2 Rose Hill Place	Cambridge	MD	21613
Choptank & Tuckahoe Rivers Water Trail	Gateway Water Trail	10215 River Landing Road	Denton	MD	21629

Appendix 3: Chesapeake Bay Gateways Network ecotourism site locations within the 5 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3.

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Annapolis and Anne Arundel Co. Information Center	Gateway Regional Info Center or Hub	26 West Street	Annapolis	MD	21403
Balitmore Visitor Center	Gateway Regional Info Center or Hub	401 Light Street	Baltimore	MD	21201
Chesapeake Bay Center (at First Landing State Park)	Gateway Regional Info Center or Hub	2500 Shore Drive	Virginia Beach	VA	23451
Chesapeake Bay Maritime Museum	Gateway Regional Info Center or Hub	Navy Point	St. Michaels	MD	216630
Chesapeake Exploration Center	Gateway Regional Info Center or Hub	425 Piney Narrows Road	Chester	MD	21619
Matthews Co. Visitors and Information Center	Gateway Regional Info Center or Hub	12 Church Street	Matthews	VA	23109
Sailwinds Visitor Center	Gateway Regional Info Center or Hub	2 Rose Hill Place	Cambridge	MD	21613
Solomons Visitor Information Center	Gateway Regional Info Center or Hub	14175 Solomons Island Road	Solomons	MD	20688
Adkins Arboretum	Gateway Site	12610 Eveland Road	Ridgely	MD	21660

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3.

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Anacostia Community Park	Gateway Site	First Street and Potomac Ave S.E.	Washington	DC	20003
Anacostia Park	Gateway Site	1900 Anacostia Drive S.E.	Washington	DC	20020
Annapolis Maritime Museum	Gateway Site	133 Bay Shore Drive	Annapolis	MD	21403
Battle Creek Cypress Swamp	Gateway Site	2880 Gray Road	Prince Frederick	MD	20678
Blackwater National Wildlife Refuge	Gateway Site	2431 Key Wallace Drive	Cambridge	MD	21613
Bladensburg Waterfront Park	Gateway Site	4601 Annapolis Road	Bladensburg	MD	20710
Calvert Cliffs State Park	Gateway Site	9500 H.G. Truman Hwy	Lusby	MD	20657
Calvert Marine Museum	Gateway Site	14200 Solomons Island Road	Solomons	MD	20688
Cape Charles Historic District	Gateway Site		Cape Charles	VA	23310
Captain Salem Avery House Museum	Gateway Site	1418 EW Shady Side Road	Shady Side	MD	20764
Chesapeake Bay Environmental Center	Gateway Site	600 Discovery Lane	Grasonville	MD	21638
Chesapeake Biological Laboratory, UMCES	Gateway Site	1 Williams Street	Solomons	MD	206880
Concord Point Lighthouse	Gateway Site	Concord and Lafayette Street	Havre de Grace	MD	210780

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Dogwood Harbor, At Tilghman Island	Gateway Site		Tilghman Island	MD	216710
Eastern Neck State Park	Gateway Site	1730 Eastern Neck Road	Rock Hall	MD	21661
Elk Neck State Park	Gateway Site	4395 Turkey Point Road	North East	MD	21901
Fells Point Historic District	Gateway Site	812 S. Ann Street	Baltimore	MD	21231
Fells Point Maritime Museum	Gateway Site	1724 Thames Street	Baltimore	MD	21231
First Landing State Park	Gateway Site	2500 Shore Drive	Virginia Beach	VA	23451
Flag Ponds Nature Park	Gateway Site	1525 Flags Pond Parkway	Lusby	MD	206750
Fort McHenry National Monument and Historic Shrine	Gateway Site	E. Fort Avenue	Baltimore	MD	21230
Fort Washington Park	Gateway Site	13551 Fort Washington Road	Fort Washington	MD	20744
Frederick Douglas-Isaac Myers Maritime Park	Gateway Site	1417 Thames Street	Baltimore	MD	21231
Galesville Heritage Society Museum	Gateway Site	988 Main Street	Galesville	MD	20765
Geddes-Piper House	Gateway Site	101 Church Alley	Chestertown	MD	21620
Great Bridge Lock Park	Gateway Site	112 Mann Drive	Chesapeake	VA	23322
Greenwell State Park	Gateway Site	25420 Rosedale Manor Lane	Hollywood	MD	20636
Havre de Grace Decoy Museum	Gateway Site	215 Giles Street	Havre de Grace	MD	21078

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Historic Annapolis Gateway-City Dock	Gateway Site	Dock Street	Annapolis	MD	21401
Historic London Town and Garden	Gateway Site	839 Londontown Road	Edgewater	MD	21037
Historic St. Mary's City	Gateway Site	Off Route 5	St. Mary's City	MD	206860
Hoffler Creek Wildlife Preserve	Gateway Site	5410 Twin Pines Road	Portsmouth	VA	23703
Huntley Meadows Park	Gateway Site	3701 Lockheed Blvd	Alexandria	VA	22306
J. Millard Tawes Museum & Ward Bros. Workshop	Gateway Site	3 9th Street	Crisfield	MD	21817
Jefferson Patterson Park and Museum	Gateway Site	10515 Mackall Road	St. Leonard	MD	20685
Kings Landing Park	Gateway Site	3255 Kings Landing Road	Huntingtown	MD	20639
Kiptopeke State Park	Gateway Site	3540 Kiptopeke Drive	Cape Charles	VA	23310
Lawrence Lewis, Jr. Park	Gateway Site	12400/12508 Willcox Wharf Road	Charles City	VA	23020
Lightship Chesapeake & 7 Foot Knoll Lighthouse	Gateway Site	Pier 3&5 Pratt Street	Baltimore	MD	21202
Martinak State Park	Gateway Site	137 Deep Shore Road	Denton	MD	21629
Mason Neck State Park	Gateway Site	7301 High Point Road	Lorton	VA	22079
Mason Neck Wildlife Refuge	Gateway Site	High Point Road	Lorton	VA	22079

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Mount Harmon Plantation	Gateway Site	600 Mount Harmon Road	Earleville	MD	21919
Myrtle Point Park	Gateway Site	24032-24069 N. Patuxent Beach Road	California City	MD	20619
Nathan of Dorchester	Gateway Site	Long Wharf and High Street	Cambridge	MD	21613
National Aquarium in Baltimore	Gateway Site	Pier 3, 501 East Pratt Street	Baltimore	MD	21202
Nauticus, National Maritime Center	Gateway Site	1 Waterside Drive	Norfolk	VA	23510
North Point State Park	Gateway Site	9000 Bay Shore Road	Edgemere	MD	21219
Parkers Creek (American Chestnut Land Trust)	Gateway Site	Scientist Cliffs Road	Port Republic	MD	20676
Patapsco Valley State Park	Gateway Site	8020 Baltimore National Pike	Ellicott City	MD	21043
Patuxent Research Refuge, Visitor Center	Gateway Site	10901 Scarlet Tanager Loop	Laurel	MD	20708
Pemberton Historical Park	Gateway Site	Pemberton Drive and Naticoke Road	Salisbury	MD	21801
Pickering Creek Audubon Center	Gateway Site	11450 Audubon Lane	Easton	MD	21601
Piney Point Lighthouse Museum and Park	Gateway Site	44720 Lighthouse Road	Piney Point	MD	20674
Piscataway Park	Gateway Site	3400 Bryan Point Road	Accokeek	MD	20607

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Pocomoke River State Forest&Park	Gateway Site	3461 Worcester Hwy	Snow Hill	MD	21863
Point Lookout State Park	Gateway Site	1175 Point Lookout Road	Scotland	MD	20687
Pride of Baltimore II	Gateway Site	401 E. Pratt Street, Suite 222	Baltimore	MD	21202
Richardson Maritime Museum	Gateway Site	401 High Street	Cambridge	MD	21613
Rock Creek Park	Gateway Site	5200 Glover Road NW	Washington	DC	20015
Sandy Point State Park	Gateway Site	1100 East College Parkway	Annapolis	MD	21409
Sassafrass NRMA & Turner's Creek Park	Gateway Site	Turner's Creek Road	Kennedyville	MD	21645
Schooner Sultana	Gateway Site	Cannon Street Dock	Chestertown	MD	21620
Scotterly Plantation	Gateway Site	44300 Scotterly Lane	Hollywood	MD	20636
Sesquehanna Museum at Havre de Grace	Gateway Site	817 Conesteo Street	Havre de Grace	MD	21078
Smith Island Center	Gateway Site	12806 Caleb Jones Road	Ewell	MD	21824
Smithsonian Environmental Research Center	Gateway Site	647 Contees Wharf Road	Edgewater	MD	21037
St. Clement's Island Potomac River Museum	Gateway Site	38370 Point Breeze Road	Colton's Point	MD	20626

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Steamboat Era Museum	Gateway Site	156 King Carter Drive	Irvington	VA	22480
Terrapin Park	Gateway Site	191 Log Canoe Circle	Stevensville	MD	21666
USS Constitution Museum	Gateway Site	301 E. Pratt Street	Baltimore	MD	21202
Ward Museum of Wildfowl Art	Gateway Site	909 S. Schumaker Drive	Salisbury	MD	21804
Wharves at Choptank Crossing	Gateway Site	12019 Riverlanding Road	Denton	MD	21629
Wye Grist Mill	Gateway Site	14296 Old Wye Mills Road	Wye Mills	MD	21679
Wye Island Natural Resource Management Area	Gateway Site	632 Wye Island Road	Queenstown	MD	21658
Baltimore and Annapolis Trail	Gateway Land Trail	51 West Earleigh Heights Road	Severna Park	MD	21146
Cross Island Trail	Gateway Land Trail		Centreville	MD	216170
Elizabeth River Trail - Atlantic City Spur	Gateway Land Trail	508 City Hall Building	Norfolk	VA	23510
Gwynns Falls Trail and Greenway	Gateway Land Trail	1920 Eagle Drive	Baltimore	MD	21207
Jones Falls Trail	Gateway Land Trail		Baltimore	MD	21201
Underground Railroad Scenic Byway (Driving Route)	Gateway Land Trail	2 Rose Hill Place	Cambridge	MD	21613

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Choptank & Tuckahoe Rivers Water Trail	Gateway Water Trail	10215 River Landing Road	Denton	MD	21629
Eastern Branch Elizabeth Water Trail	Gateway Water Trail		Virginia Beach	VA	234500
Matthews Blueways Water Trail	Gateway Water Trail		Matthews	VA	23109
Potomac River Water Trail (end)	Gateway Water Trail	1175 Point Lookout Road	Scotland	MD	20687
Rappahannock River Water Trail	Gateway Water Trail		Fredericksburg	VA	22404

Appendix 4: Chesapeake Bay Gateways Network ecotourism site locations within the 10 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3.

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Annapolis and Anne Arundel Co. Information Center	Gateway Regional Info Center or Hub	26 West Street	Annapolis	MD	21403
Balitmore Visitor Center	Gateway Regional Info Center or Hub	401 Light Street	Baltimore	MD	21201
Chesapeake Bay Center (at First Landing State Park)	Gateway Regional Info Center or Hub	2500 Shore Drive	Virginia Beach	VA	23451
Chesapeake Bay Maritime Museum	Gateway Regional Info Center or Hub	Navy Point	St. Michaels	MD	216630
Chesapeake Exploration Center	Gateway Regional Info Center or Hub	425 Piney Narrows Road	Chester	MD	21619
Matthews Co. Visitors and Information Center	Gateway Regional Info Center or Hub	12 Church Street	Matthews	VA	23109
Sailwinds Visitor Center	Gateway Regional Info Center or Hub	2 Rose Hill Place	Cambridge	MD	21613
Solomons Visitor Information Center	Gateway Regional Info Center or Hub	14175 Solomons Island Road	Solomons	MD	20688
Adkins Arboretum	Gateway Site	12610 Eveland Road	Ridgely	MD	21660
Anacostia Community Park	Gateway Site	First Street and Potomac Ave S.E.	Washington	DC	20003

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3.

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Anacostia Park	Gateway Site	1900 Anacostia Drive S.E.	Washington	DC	20020
Annapolis Maritime Museum	Gateway Site	133 Bay Shore Drive	Annapolis	MD	21403
Battle Creek Cypress Swamp	Gateway Site	2880 Gray Road	Prince Frederick	MD	20678
Blackwater National Wildlife Refuge	Gateway Site	2431 Key Wallace Drive	Cambridge	MD	21613
Bladensburg Waterfront Park	Gateway Site	4601 Annapolis Road	Bladensburg	MD	20710
Calvert Cliffs State Park	Gateway Site	9500 H.G. Truman Hwy	Lusby	MD	20657
Calvert Marine Museum	Gateway Site	14200 Solomons Island Road	Solomons	MD	20688
Cape Charles Historic District	Gateway Site		Cape Charles	VA	23310
Captain Salem Avery House Museum	Gateway Site	1418 EW Shady Side Road	Shady Side	MD	20764
Chesapeake Bay Environmental Center	Gateway Site	600 Discovery Lane	Grasonville	MD	21638
Chesapeake Bay Railway Museum	Gateway Site	4155 Mears Ave	Chesapeake Beach	MD	207320
Chesapeake Biological Laboratory, UMCES	Gateway Site	1 Williams Street	Solomons	MD	206880
Concord Point Lighthouse	Gateway Site	Concord and Lafayette Street	Havre de Grace	MD	210780
Dogwood Harbor, At Tilghman Island	Gateway Site		Tilghman Island	MD	216710

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Dutch Gap Conservation Area	Gateway Site	411 Coxendale Road	Chesterfield	VA	238320
Eastern Neck State Park	Gateway Site	1730 Eastern Neck Road	Rock Hall	MD	21661
Eastern Shore of Virgina National Wildlife Refuge	Gateway Site	5003 Hallett Circle	Cape Charles	VA	23310
Elk Neck State Park	Gateway Site	4395 Turkey Point Road	North East	MD	21901
Fells Point Historic District	Gateway Site	812 S. Ann Street	Baltimore	MD	21231
Fells Point Maritime Museum	Gateway Site	1724 Thames Street	Baltimore	MD	21231
First Landing State Park	Gateway Site	2500 Shore Drive	Virginia Beach	VA	23451
Flag Ponds Nature Park	Gateway Site	1525 Flags Pond Parkway	Lusby	MD	206750
Fort McHenry National Monument and Historic Shrine	Gateway Site	E. Fort Avenue	Baltimore	MD	21230
Fort Washington Park	Gateway Site	13551 Fort Washington Road	Fort Washington	MD	20744
Frederick Douglas-Isaac Myers Maritime Park	Gateway Site	1417 Thames Street	Baltimore	MD	21231
Galesville Heritage Society Museum	Gateway Site	988 Main Street	Galesville	MD	20765
Geddes-Piper House	Gateway Site	101 Church Alley	Chestertown	MD	21620
George Washington Birthplace NM	Gateway Site	1732 Popes Creek Road	Washingtons Birthplace	VA	223330
Great Bridge Lock Park	Gateway Site	112 Mann Drive	Chesapeake	VA	23322

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Great Falls Park	Gateway Site	9200 Old Dominion Drive	McLean	VA	221010
Greenwell State Park	Gateway Site	25420 Rosedale Manor Lane	Hollywood	MD	20636
Havre de Grace Decoy Museum	Gateway Site	215 Giles Street	Havre de Grace	MD	21078
Historic Annapolis Gateway-City Dock	Gateway Site	Dock Street	Annapolis	MD	21401
Historic London Town and Garden	Gateway Site	839 Londontown Road	Edgewater	MD	21037
Historic St. Mary's City	Gateway Site	Off Route 5	St. Mary's City	MD	206860
Hoffler Creek Wildlife Preserve	Gateway Site	5410 Twin Pines Road	Portsmouth	VA	23703
Huntley Meadows Park	Gateway Site	3701 Lockheed Blvd	Alexandria	VA	22306
J. Millard Tawes Museum & Ward Bros. Workshop	Gateway Site	3 9th Street	Crisfield	MD	21817
James Mills Scottish Factor Store	Gateway Site	Virginia Street	Urbanna	VA	23175
Janes Island State Park	Gateway Site	26280 Alfred Lawson Dr.	Crisfield	MD	21817
Jefferson Patterson Park and Museum	Gateway Site	10515 Mackall Road	St. Leonard	MD	20685
Kings Landing Park	Gateway Site	3255 Kings Landing Road	Huntingtown	MD	20639
Kiptopeke State Park	Gateway Site	3540 Kiptopeke Drive	Cape Charles	VA	23310

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Lawrence Lewis, Jr. Park	Gateway Site	12400/12508 Willcox Wharf Road	Charles City	VA	23020
Leesylvania State Park	Gateway Site	2001 Daniel K. Ludwig Drive	Woodbridge	VA	221910
Lightship Chesapeake & 7 Foot Knoll Lighthouse	Gateway Site	Pier 3&5 Pratt Street	Baltimore	MD	21202
Mariners' Museum	Gateway Site	100 Museum Drive	Newport News	VA	23606
Marshy Point Park	Gateway Site	7130 Marshy Point Road	Baltimore	MD	21220
Martinak State Park	Gateway Site	137 Deep Shore Road	Denton	MD	21629
Mason Neck State Park	Gateway Site	7301 High Point Road	Lorton	VA	22079
Mason Neck Wildlife Refuge	Gateway Site	High Point Road	Lorton	VA	22079
Merkle Wildlife Sanctuary	Gateway Site	11704 Fenno Road	Upper Marlboro	MD	20772
Mount Harmon Plantation	Gateway Site	600 Mount Harmon Road	Earleville	MD	21919
Myrtle Point Park	Gateway Site	24032-24069 N. Patuxent Beach Road	California City	MD	20619
Nassawango Creek Preserve-Furnace Town	Gateway Site	3816 Old Furnace Road	Snow Hill	MD	21863
Nathan of Dorchester	Gateway Site	Long Wharf and High Street	Cambridge	MD	21613
National Aquarium in Baltimore	Gateway Site	Pier 3, 501 East Pratt Street	Baltimore	MD	21202

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Nauticus, National Maritime Center	Gateway Site	1 Waterside Drive	Norfolk	VA	23510
North Point State Park	Gateway Site	9000 Bay Shore Road	Edgemere	MD	21219
Occoquan Bay National Wildlife Refuge	Gateway Site	14050 Dawson Beach Road	Woodbridge	VA	22191
Parkers Creek (American Chestnut Land Trust)	Gateway Site	Scientist Cliffs Road	Port Republic	MD	20676
Patapsco Valley State Park	Gateway Site	8020 Baltimore National Pike	Ellicott City	MD	21043
Patuxent Research Refuge, Visitor Center	Gateway Site	10901 Scarlet Tanager Loop	Laurel	MD	20708
Patuxent River Park, Jug Bay Natural Area	Gateway Site	16000 Croom Airport Road	Upper Marlboro	MD	20772
Pemberton Historical Park	Gateway Site	Pemberton Drive and Naticoke Road	Salisbury	MD	21801
Pickering Creek Audubon Center	Gateway Site	11450 Audubon Lane	Easton	MD	21601
Piney Point Lighthouse Museum and Park	Gateway Site	44720 Lighthouse Road	Piney Point	MD	20674
Piscataway Park	Gateway Site	3400 Bryan Point Road	Accokeek	MD	20607
Pocomoke River State Forest&Park	Gateway Site	3461 Worcester Hwy	Snow Hill	MD	21863
Point Lookout State Park	Gateway Site	1175 Point Lookout Road	Scotland	MD	20687

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.

NAME	TYPE	ADDRESS	CITY	STATE	ZIP
Pride of Baltimore II	Gateway Site	401 E. Pratt Street, Suite 222	Baltimore	MD	21202
Rappahannock River Valley Nat. Wildlife Refuge	Gateway Site	336 Wilna Road	Warsaw	VA	22572
Richardson Maritime Museum	Gateway Site	401 High Street	Cambridge	MD	21613
Rock Creek Park	Gateway Site	5200 Glover Road NW	Washington	DC	20015
Sandy Point State Park	Gateway Site	1100 East College Parkway	Annapolis	MD	21409
Sassafrass NRMA & Turner's Creek Park	Gateway Site	Turner's Creek Road	Kennedyville	MD	21645
Schooner Sultana	Gateway Site	Cannon Street Dock	Chestertown	MD	21620
Scotterly Plantation	Gateway Site	44300 Scotterly Lane	Hollywood	MD	20636
Sesquehanna Museum at Havre de Grace	Gateway Site	817 Conesteo Street	Havre de Grace	MD	21078
Smallwood State Park	Gateway Site	2750 Sweeden Point Road	Marbury	MD	20658
Smith Island Center	Gateway Site	12806 Caleb Jones Road	Ewell	MD	21824
Smithsonian Environmental Research Center	Gateway Site	647 Contees Wharf Road	Edgewater	MD	21037
St. Clement's Island Potomac River Museum	Gateway Site	38370 Point Breeze Road	Colton's Point	MD	20626
Steamboat Era Museum	Gateway Site	156 King Carter Drive	Irvington	VA	22480

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Stratford Hall Plantation	Gateway Site	483 Great House Road	Stratford	VA	22558
Sturgis Memorial Gateway	Gateway Site	River and Washington Street	Snow Hill	MD	21863
Terrapin Park	Gateway Site	191 Log Canoe Circle	Stevensville	MD	21666
USS Constitution Museum	Gateway Site	301 E. Pratt Street	Baltimore	MD	21202
Virginia Living Museum	Gateway Site	524 J. Clyde Morris Blvd	Newport News	VA	23601
Ward Museum of Wildfowl Art	Gateway Site	909 S. Schumaker Drive	Salisbury	MD	21804
Washington Ferry Farm	Gateway Site	268 Kings Hwy	Fredericksburg	VA	22405
Westmoreland State Park	Gateway Site	1650 State Park Road	Montross	VA	22520
Wharves at Choptank Crossing	Gateway Site	12019 Riverlanding Road	Denton	MD	21629
Wye Grist Mill	Gateway Site	14296 Old Wye Mills Road	Wye Mills	MD	21679
Wye Island Natural Resource Management Area	Gateway Site	632 Wye Island Road	Queenstown	MD	21658
Baltimore and Annapolis Trail	Gateway Land Trail	51 West Earleigh Heights Road	Severna Park	MD	21146
Cross Island Trail	Gateway Land Trail		Centreville	MD	216170
Elizabeth River Trail - Atlantic City Spur	Gateway Land Trail	508 City Hall Building	Norfolk	VA	23510

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3. **(Continued)**

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within 10 miles of mapped restoration sites within the Chesapeake Bay Watershed.					
NAME	**TYPE**	**ADDRESS**	**CITY**	**STATE**	**ZIP**
Gwynns Falls Trail and Greenway	Gateway Land Trail	1920 Eagle Drive	Baltimore	MD	21207
Jones Falls Trail	Gateway Land Trail		Baltimore	MD	21201
Underground Railroad Scenic Byway (Driving Route)	Gateway Land Trail	2 Rose Hill Place	Cambridge	MD	21613
Choptank & Tuckahoe Rivers Water Trail	Gateway Water Trail	10215 River Landing Road	Denton	MD	21629
Eastern Branch Elizabeth Water Trail	Gateway Water Trail		Virginia Beach	VA	234500
Matthews Blueways Water Trail	Gateway Water Trail		Matthews	VA	23109
Potomac River Water Trail (end)	Gateway Water Trail	1175 Point Lookout Road	Scotland	MD	20687
Rappahannock River Water Trail	Gateway Water Trail		Fredericksburg	VA	22404

Appendix 5: Chesapeake Bay Gateways Network ecotourism site locations within the 15 mile buffer applied to mapped NOAA restoration sites within the lower Chesapeake Bay Watershed, using ArcGIS v9.3.