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Estimating Economic Impact from Inlet Formation

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Abstract

Average per person per day spending by visitors to the Outer Banks has been derived through recent and on-going research projects. The purpose of this project will be to determine the loss of economic impact due to loss of access in the form of new inlet formation. This will be accomplished through mapping and inventorying visitor accommodations and amenities on the outer banks and determining which of these would no longer be accessible in the case of inlet formation due to a storm event. With the location of probable inlet formations provided through other phases of this project, we can estimate the daily loss of income that results from loss of access to different sites within the region. Direct, indirect, and induced economic impact losses will be calculated and presented on a per day basis for all sites where inlet formations are likely.

Keywords: Outer Banks, Tourism, Economic Impact, Inlet Formation

Purpose of Project

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Inventory of Accommodations

The first step in completing this project was to inventory and map all accommodations between the highway 64 bridge in South Nags Head and Hatteras Inlet beyond the village of Hatteras. In order to accomplish this, project personnel drove and walked through all the villages along highway 12 and took down information on all properties that they were able to identify as providing overnight accommodations to visitors. In all, project personnel were able to identify and provide GPS coordinates for a total of 3026 properties which included rental cottages, hotels, motels, campgrounds, RV parks, and condominium complexes that included rental units. One limitation of this project is that despite this exhaustive search, it is likely that not every possible property was included due to difficulties in identifying what private condominiums are permanent residencies or are available for short term rentals.

Data collected during this stage included type of accommodation, GPS latitude and longitude of the property, property management company and unit number if applicable, the physical address of each property, and the capacity (i.e. number of room, campsites, etc.) if the property was a hotel/motel or campground. With the exception of the GPS coordinates, which will be used to determine what properties will be made inaccessible due to inlet formations, the other data that was recorded was used to help determine the capacity of each property.

Determining Capacity

After all of the accommodations were inventoried and mapped, the next step in the process was to estimate the overnight capacity for each property. This was accomplished either through the capacity data collected on-site or by using the property identifiers collected on site and looking up each property on-line to find out the number of bedrooms that it has. It was assumed that each bedroom in a rental cottage would accommodate 2 people. Thus a 5 bedroom rental cottage was assigned a capacity of 10. For properties that the identifiers were not capable of locating on-line, a stratified (village, property type, and property management agency) mean was substituted for the property capacity. This exercise resulted in an estimate of the study region having a total overnight visitor capacity of 34,611.

Expenditure Data

The most recent and accurate estimate of visitor expenditures on the Outer Banks was completed during a 2001 and 2002 visitor use study by the National Park Service. These data based on reported expenditures from 888 overnight visitors to the region are summarized in Table 1.

Table 1. Economic Expenditures

Types of Expenditures	Average Daily Expenditures
Admission Fees	$.98
Food and Beverage (includes restaurants, taverns, groceries, etc)	$25.77
Shopping (includes clothing, personal items, souvenirs, etc)	$14.95
Lodging (includes hotels, cottages, B&Bs, etc)	$61.26
Transportation (includes parking fees, gasoline, etc)	$11.19
Entertainment and Recreation	$6.24
All Other Expenses	$9.54
Total	**$129.92**

The data in Table 1 indicate that overnight visitors to the region spend an average of almost $130.00 per day within the Outer Banks region. The highest category of spending was for lodging at $61.26 per day, followed by food and beverages at $25.77 per day. Furthermore, these expenditure data are fairly robust. Analysis of variance was used to test for spending differences across seasons and although there were slight variances between seasons, none of them were significant. Therefore, it is appropriate to use these averages when calculating impacts throughout the calendar year.

Economic Impact from Inlet Formation

As stated previously, the purpose of this project is to estimate the economic impact resulting from new inlet formation. This will be accomplished based on the idea that if visitors are cut off from their accommodations because they have become inaccessible due to a breach in the land resulting from an inlet formation, they will not visit the region. Thus, not only will the expenditures they provide for overnight accommodations be lost, but spending in other tourism categories will also be curtailed.

To estimate these impacts, it is necessary to be able to predict where the most likely sites for an inlet to form are. To this end, project personnel in the geo-sciences were consulted to provide a list of the most likely sites for inlet formation. These are shown on the map in Figure 1.

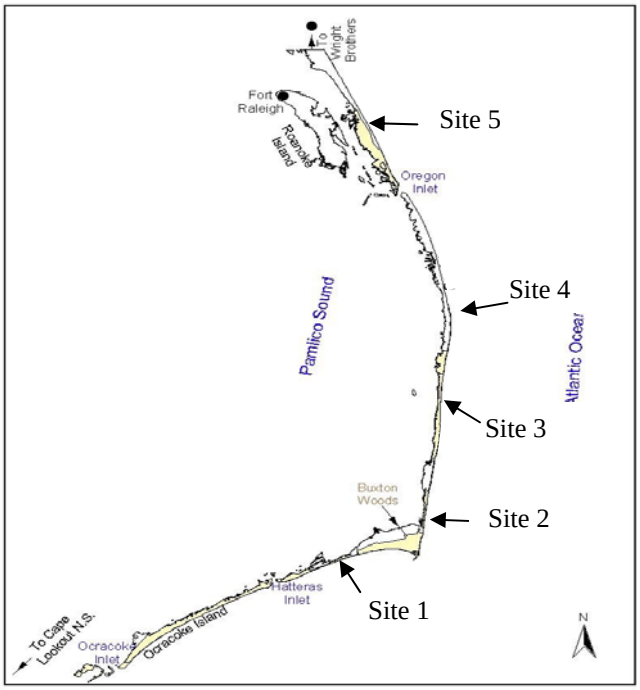

Figure 1. Most Likely Sites for Inlet Formation

Due to the fact that different inlet locations will stop access at different areas, they will also create different economic impacts. The further north in the study area that an inlet forms, the more severe it resulting economic impact will be. The following economic impacts are described in order form the least severe to the most sever in terms of economic loss from tourism to the Outer Banks region:

Site 1 (Isabel Inlet) 75.39.39.73 West & 35.13.9.44 North
An inlet formation occurring at this site within the village of Frisco would deny access to the southern portion of Frisco and the entire village of Hatteras. It is estimated that it would make 604 accommodation units inaccessible with a capacity of 6904 overnight guests. Thus, during peak season it would displace up to 6904 visitors resulting in a daily economic loss of $896,967.68. This is a site that has sustained a previous inlet during Hurricane Isabel in 2003.

Site 2 (Walkover Day Use Area) 75.30.53.04 West & 35.17.27.27 North
In addition to cutting off all areas made inaccessible by site 1, an inlet formation occurring at this site just north of Buxton would eliminate access to all of Frisco and to the village of Buxton. It is estimated that it would make 808 accommodation units inaccessible with a capacity of 10,451 overnight guests. Thus, during peak season it would displace up to 10,451 visitors resulting in a daily economic loss of $1,357,793.92
This is a site that has been plagued by inlet formations for many years.

Site 3 (Kinnakeet) 75.29.0.74 West & 35.27.50.86 North
An inlet formation occurring at this site within the Chicamacomico area would eliminate access to the Villages of Hatteras, Frisco, Buxton and Avon. It is estimated that it would make 1545 accommodation units inaccessible with a capacity of 17,566 overnight guests. Thus, during peak season it would displace up to 17,566 visitors resulting in a daily economic loss of $2,282,174.72.

Site 4 (S-Curves) 75.28.7.11 West & 35.37.18.49 North
An inlet formation occurring at this site within the Pea Island national Wildlife Refuge would have the same impact on access as would losing the Bonner Bridge over Oregon Inlet. Access to every Village below Oregon Inlet would be lost. It is estimated that it would make 2359 accommodation units inaccessible with a capacity of 27,991 overnight guests. Thus, during peak season it would displace up to 27,991 visitors resulting in a daily economic loss of $3,636,590.72.

Site 5 (Whalebone Junction) 75.35.20.92 West & 35.53.36.89 North
This would be the most economically devastating site for inlet formation. In addition to eliminating access to all of the villages in the central Out Banks, it would also eliminate access to the majority of South Nags Head. It is estimated that it would make 2838 accommodation units inaccessible with a capacity of 32,501 overnight guests. Thus, during peak season it would displace up to 32,501 visitors resulting in a daily economic loss of $4,222,529.92.

One must realize that the figures provided above are the direct impacts resulting from visitor expenditures. There are also additional economic impacts as described below:

Indirect impacts: Result from the businesses that make purchases from other businesses as a result of the initial spending.

Induced impacts: Reflect the increases in household spending resulting from increases in compensation.

For example, the total money spent to eat in restaurants is the ***direct*** impact. The local expenditures made by the restaurant as a result of the increased customers such as additional groceries needed by the restaurant or additional laundry expenses represent the ***indirect*** impact. The additional compensation received by the employees of the restaurant also causes additional purchases in the local economy resulting in the ***induced*** impact.

For this project, the indirect and induced impacts, as well as the number of new jobs created through economic activity, were calculated through the Implan® software package. This software incorporates an input/output social matrix model that takes into account the types of industries within a region and estimates indirect and induced impacts due to changes in demand for products and services. Table 2 provides a summary of the total daily economic impacts resulting from the decrease in visitation due to inlets formed at the aforementioned sites.

Table 2 Daily Economic Impacts

Site	Direct Impacts	Indirect Impacts	Induced Impacts	Total Impacts
1	$896,967.68	136,554	135,532	$1,169,054.68
2	$1,357,793.92	206,710	205,163	$1,769,668.92
3	$2,282,174.72	347,437	344,837	$2,974,451.72
4	$3,636,590.72	553,633	549,489	$4,739,716.72
5	$4,222,529.92	642,836	638,024	$5,503,394.92

As Table 2 demonstrates, the loss of expenditures (direct impacts) is only a portion of the entire economic impact picture. The total impacts resulting from inlet formation range from $1,169,054.68 per day to $5,503,394.92 per day, dependant on the site where the inlets may form.

Discussion

The analysis described above provides a grim look at the economic consequences to the local economy due to a loss of tourism resulting from new inlet formation. In addition, it is important to realize that the above figures are loss estimates on a per day basis. Since most inlet formations require several days to repair, the resulting economic losses are likely to be far greater than the figures provided.

It is also important to realize that this project is limited in scope to the economic impacts to the tourism industry. No effort went into estimating negative impacts associated with inlet formation and shore erosion that damaged structures other than the transportation infrastructure. In the event of a weather or climate event that creates a new inlet, it is likely that other structural damage will occur. Additional care should be considered when predicting where inlets are likely to form. While the areas identified in this project as potential sites for inlet formation were selected by coastal geologists as having very high vulnerability, these same geologists warn that the entire study area is vulnerable to inlet formation, and many other areas not identified by this project are also at considerable risk. An additional limitation of this project is that economic impacts were calculated based on the full carrying capacity of the properties or units that access was lost to. While in peak tourist season, these impact estimates are likely to be more accurate, at other times of the year, the region is nowhere near capacity, and the above figures will have overestimated the negative impacts of inlet formation. It is suggested that future research in this arena attempt to incorporate seasonal or monthly occupancy rates into the formula for calculating negative economic impacts.

This analysis also provides an example of the difficulties associated with linear spaces that have limited access points. Due to the fact that the lone adequate access point for the entire central region of the Outer banks is Highway 12, the tourism economy is quite vulnerable to

disruption by any storm or climactic event that breaches this highway. If viable additional access points were provided, perhaps through the use of a high speed ferry system, the negative economic impacts from new inlet formation could be drastically reduced.

References

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