



# The influence of weather on the recreational uses of coastal lagoons in Rhode Island, USA



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## ARTICLE INFO

### Keywords:

Coastal recreation  
Climate change  
Weather thresholds  
Coastal lagoons  
GIS  
B-BOTS

## ABSTRACT

The recreational uses of coastal lagoons (also known locally as salt ponds) contribute significantly to the important tourism economy of the southern part of the US state of Rhode Island. The lagoons are valued highly for the wide range of recreational services they provide, such as fishing, clamming, rowing, boating, or merely relaxing. Outdoors on or near the water, weather conditions may influence individual recreation decisions strongly. A changing climate is expected to affect weather conditions in Rhode Island, thereby potentially influencing when, how, and how much recreation will take place in the coastal areas of the state. Through direct observations of human activities on coastal lagoons, the sensitivity of coastal recreational uses to changes in weather conditions was assessed. If future changes in climate bring warmer temperatures and more intense wind and rain events, our results suggest that there may be a decrease in relaxing, rowing, and fishing on coastal lagoons when days are hotter and a decrease in rowing and fishing when days are windier. Nevertheless, warmer temperatures also may lengthen the summers, leading to an overall increase in the peak coastal recreation season. However, during the hottest periods, there may be a shift toward more motor boating and away from other uses, motor boaters were more resistant than other users to changes when temperatures increase. Understanding how weather and climate influence coastal recreation could help coastal managers and businesses better plan for the future in Rhode Island and other coastal environments worldwide.

## 1. Introduction

The main goal of this research is to help predict how changes in microclimate might affect the recreational use of coastal lagoons (or coastal ponds, as they're called locally) in Rhode Island. This information informs local planners, state regulators, and businesses about what to expect so that they can adapt to changes in weather from climate change. Based on the statistical relationship between recreational users and weather, climate preferences of different recreational user groups around the coastal lagoons in Rhode Island are inferred. Observational data of recreational activities from boat-based surveys during the summers of 2014 and 2015 provide the dependent variable for examining relationships between activities and weather conditions through regression analyses.

Five total groups were analyzed: all recreational users (the four distinct groups tested along with all other types of recreational uses not separately tested); individuals relaxing (relaxers), individuals in rowed crafts (rowers), individuals in motorized vessels (motor boaters), and fishers (including both clam diggers and hook-and-line anglers). Rowed

crafts were characterized as individuals using manual force to power their boat or board (e.g., kayaks, stand-up paddleboards, etc.) and motor boaters were defined as those engaged in recreational motor boating only.

This article will provide a brief background of coastal recreation and tourism in Rhode Island, predicted future weather with climate change in the state, and a brief overview of the literature. The methods, analysis, discussion, and conclusion will follow.

### 1.1. Coastal recreation and tourism in Rhode Island

Rhode Island is just 37 miles wide and 48 miles long but it has over 400 miles of coastline [26]. Although all five of Rhode Island's counties are coastal, the state's nickname "The Ocean State" rings especially true along Rhode Island's 20-mile long southern shore where barrier beaches are separated from the mainland by a stretch of nine unique coastal lagoons (Figs. 1 and 2).

The lagoons are shallow, biologically productive marine embayments separated from the ocean by barrier spits with engineered

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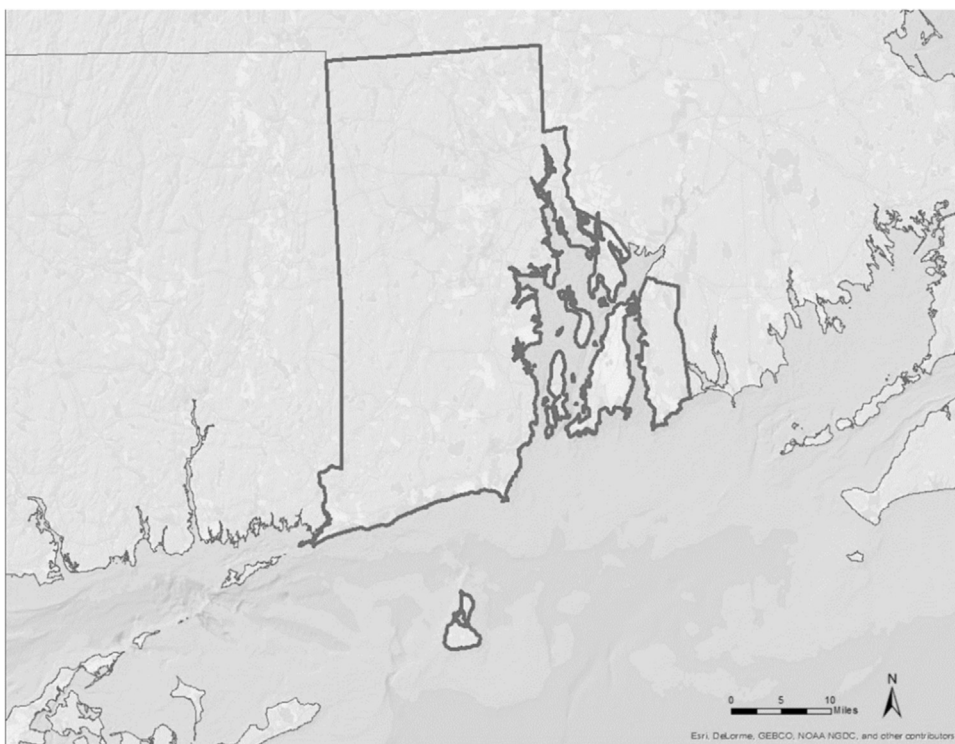


Fig. 1. Rhode Island, USA (source: RIGIS and ESRI).

breachways, allowing for navigation and daily tidal flushing. The lagoons provide important ecosystem and habitat functions for both finfish and shellfish [2] as well as areas for hunting, fishing, swimming, nature-exploring, bird watching, and pleasure boating [14].

The coastal ponds in Rhode Island are centers of recreational use and tourism. Recreators are drawn to the shore when the weather is warm to cool off, relax, and enjoy the many activities both the open Block Island Sound beaches and the more protected ponds have to offer. During the summer months in Rhode Island, tourists and recreators provide an influx of consumers for local businesses and the income that sustains these businesses during the leaner offseason. The total economic impact of tourism in Rhode Island is between \$3 and \$4 billion annually, which is between 5% and 6% of the state's annual GDP. It is

the fourth largest private sector employer in Rhode Island with more than 45,000 tourism supported jobs, both direct and indirect [21]. The coastal ponds are not only home to one of the biggest fishing ports in New England, Point Judith, but they also host almost 20 private marinas as well as numerous camping grounds, parks, neighborhood associations, and public boat ramps and access points. The marinas and boat ramps provide boaters and fishermen not only access to the ponds themselves but also easy access to the open ocean through the breachways. Aside from beach going, tourism and recreation on the ocean, including boat dealers, marinas, scenic water tours, hotel and lodging etc., contributes \$89.25 billion dollars to the United States economy and accounts for almost 2 million jobs [15].

Weather is inextricably linked to coastal tourism and recreation and

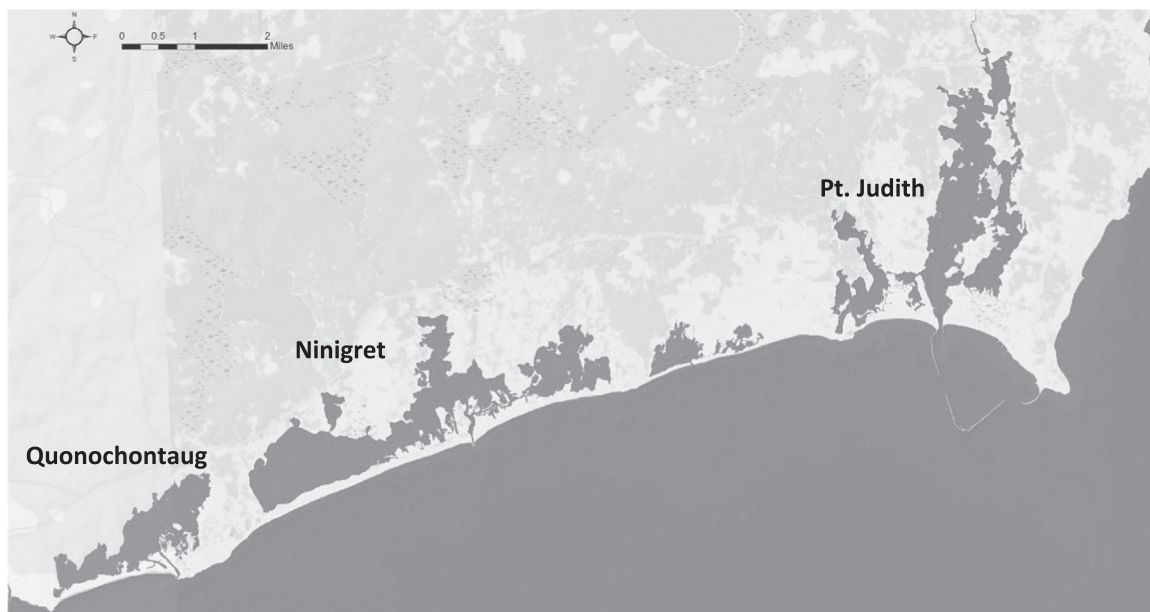


Fig. 2. Southern shore of Rhode Island: coastal lagoons (source: RIGIS and ESRI).

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