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Conflict resolution in coastal waters: the case of personal watercraft

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Abstract

The number of personal watercraft (PWC) used in coastal and inland waterways has increased recently, potentially disturbing people, fisheries activities, and wildlife and recreational resources. In 1997 we examined the behavior of nesting Common Terns as a function of exposure to PWC and other boats. PWCs traveled faster than motorboats near nesting islands, and came closer to birds. The number of terns that flew up in response to PWCs was greater than to motorboats. On one long-studied tern island, the terns suffered nearly total reproductive failure in 1996 and 1997. Because of these adverse effects, an educational and enforcement campaign was initiated in 1998. Public meetings included presentations by scientists, marine police, state conservation officials, PWC associations, marina owners, and the general public. In addition, an educational campaign was aimed at local PWC rental businesses and docks, and additional signs were posted around tern nesting islands. These measures proved effective: PWC traffic around the nesting islands was reduced, most PWCs that passed the tern nesting island did not venture outside the channel, and most PWCs reduced their speed. Although these measures did not eliminate the problem, they reduced the disturbance to the birds in 1998 and 1999, allowing increased reproductive success, representing a successful co-management program.

Keywords: Conflict resolution; Co-management; Commons; Policy; Social institutions

1. Introduction

Increasing industrial, recreational, and residential development along the coastal regions of the United States has increased the potential for conflicts among user groups. While marine policy often addresses conflicts and conflict-resolution among user groups, the position of resource protection for resources that are not of commercial value is unclear. Protection of natural resources normally falls within the purview of state agencies such as conservation departments, or of the US Fish and Wildlife Service. Such agencies are responsible for protecting endangered or threatened species of wildlife, as well as species covered by the migratory bird or other treaties. While it is within their mandate to protect animals and their offspring, the protection of habitat is a more difficult issue. How they might regulate the movement of boats around resources such as grass beds that serve as nurseries for fish and shellfish or bird-nesting islands is less clear.

Regardless of the strength or value of policies governing the movement of boats in coastal and estuarine waters, marine policies will not be effective when there is a rapid increase in one type of boat use, or a rapid expansion in the spatial or temporal use of waterways. Over the past ten years there has been a rapid increase in the use of personal watercraft (PWCs) in the United States, from an annual sales of about 30,000 in 1987 to over 150,000 (Fig. 1). PWCs can travel as fast or faster than conventional boats in extremely shallow water, and because of shallow drafts, can go many places that motor boats cannot [1,2]. Although PWCs account for only 11% of the registered boats, they are responsible for 35% of the accidents and 44% of injuries [2,3]. Further, the noise created by PWCs has led to many parks and reserves banning or severely restricting their use [3–6], and the National Park Service has published in the Federal Register their intent to severely restrict their use within the park system [3].

While the National Park Service and other agencies are restricting PWC use, mainly on inland waters, there

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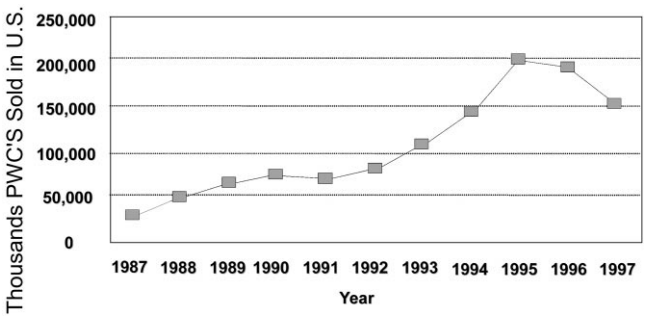

Fig. 1. Sales of personal watercraft in the United States from 1987 to the present. This graph represents first-time sales, not resales.

are severe conflicts in coastal regions with recreational and commercial fishermen [7,8]. They find that PWCs disturb them while they are pulling nets or traps, and disrupt their gear while it is set. Moreover, a wide range of residents living in coastal regions rank PWCs as the most severe environmental problem in the estuaries, above other problems such as chemical pollution, "junk or debris", overfishing, and boat oil [7].

In addition to disrupting the activities of other people in marine environments, PWCs have the potential for disturbing a wide range of natural resources, including spawning fish, fish and shellfish nurseries, and nesting birds [3,5,6]. Data on such disturbances, however, are usually anecdotal. However, from 1976 until the present, one of us (JB) has been monitoring population dynamics and reproductive success of common terns (*Sterna hirundo*) in Barnegat Bay [9]. Although Common Terns usually return to the same island to breed each year, there is some natural movement among nesting islands. Since the early 1990s, Little Mike's Island has contained one of the largest nesting colonies in Barnegat Bay, and prior to 1996 the colony of 250 to 500 nesting pairs was highly successful (fledging over 1 young per nest, 10). In 1996 there was a sharp increase in PWCs in the vicinity, and Common Terns nesting on Mike's Island were frequently disturbed and flew from their nests, and there was no reproduction. This prompted us to investigate the effects of PWCs on the nesting success of Common Terns.

Our initial objective was to document the response of Common Terns to PWCs over a two year period (breeding seasons of 1997 and 1998). However, the results were so dramatic in 1997 that they stimulated interest in resolving the conflicts between the birds and PWCs. In this paper we describe the effects of boats, including PWCs, on nesting terns in 1997 [10], describe management strategies employed in the winter of 1997–1998 to mitigate the effects of PWCs on nesting terns, and examine the efficacy of these measures on nesting terns in 1998. Our overall objective in 1998 was to determine if the methods were successful so that they could serve as a pilot for management elsewhere along the New Jersey coast.

2. Methods

Observations were made from early July until 2 August 1997 and 1998 on Common Terns nesting on Little Mike's Island in northern Barnegat Bay, New Jersey (Fig. 2). This small, low, salt marsh island is 45 m from the nearby barrier island, and 60 m from Mike's Island. There is a marked boat channel between Little Mike's Island and residential communities on the barrier island, which is regularly used by motor boats. The channel is posted for "no wake," and "no wake" signs are posted on bulkheads and docks. Conventional motor boats and larger craft can only move through the channel, but PWCs can go completely around the nesting island.

Since the early 1990s, Little Mike's Island has contained one of the largest nesting colonies of Common Terns in the bay (250–500 pairs), and prior to 1996, this colony was highly successful (fledging over 1 young/nest, 10,11). In 1996 there was an upsurge in the number of PWCs around the island, and JB found that the terns were often flying overhead. In some cases, the PWCs actually skimmed over the edge of the island at high tide, running over some nests with eggs or chicks [11].

In 1997 and 1998 observations were made to determine whether the response of the terns varied with the different types of boats (we include PWC under the rubric of "boats"). The flight behavior of Common Terns was recorded as a function of whether there were craft present, and the type of craft present. Three classes of boats were distinguished: motor boats, personal watercraft where the driver stands up, and longer personal watercraft where the driver (and riders) sits down. Observations were made every 10 min, and whenever a boat was present, for up to 8 h a day. Data recorded included date, time of day, type of observation (no craft, motor boat, stand-up PWC, sit-down PWC), location (channel side or outside of island), distance from island (near third, middle third, and far third of the waterway), speed (slow with no wake, fast, or racing with a large wake), number of birds flying over the colony per min, and the number of birds flying over the colony in the second min and in the third min after the boat passed. In the analysis we eliminated from the no craft category any observation when a boat had passed within the preceding 5 min. Although this was arbitrary, usually the birds had settled down within this period if there was no other disturbance.

These observations required two observers: one to take information on the craft type (speed, location) and one to observe the birds. Observations were made with binoculars from a dock on the barrier island. The birds were not affected by our presence. The data on flight behavior in the second and third minute after passing of