2001 Storm Events Impact Sea Turtle Nests and Shoreline on Keewaydin Island, Florida

Keewaydin Island is a primary barrier island located off the coast of Naples, in Collier County, Florida (Figure 1). Keewaydin Island is monitored nightly for loggerhead, *Caretta caretta*, nesting activity by The Conservancy of Southwest Florida, a local non-profit agency. Nesting activity occurs from May to August with hatching continuing until October. The nesting season overlaps with hurricane season, which extends from June to November and peaks during September. Most nests are either hatched or fairly advanced in development by the time catastrophic storms impact the coast. During 2001, however, a major storm event occurred in July. The July storm hit Keewaydin Island when the first nests of the season were beginning to hatch and many nests were still early in development. Several days of rainfall and strong onshore winds coupled with high tides and surf either severely inundated or washed away numerous sea turtle nests (Figure 2). Two more major storm events impacted southwest Florida before the end of turtle season. Hurricane Barry impacted the coast in the beginning of August, with more rain and rough seas destroying additional turtle nests. Tropical storm Gabrielle impacted the coast the middle of September, washing out the remaining unhatched nests. Out of 184 nests laid on Keewaydin Island, 104 were washed away (Figure 3).

During the 2001 turtle season Rookery Bay NERR researcher, Jill Schmid, in cooperation with the Conservancy of Southwest Florida conducted a study to examine sea turtle nest incubation temperatures by deploying HOBO temperature data loggers in nests. Data loggers recorded hourly temperatures of the nest throughout incubation.

Sea turtles have temperature-dependent sex determination (TSD). According to Mrosovsky (1988), the pivotal temperature of North American loggerhead is 29°C in which equal numbers of males and females are produced. Temperatures above 32°C produce all females and temperatures below 28°C produce all males (Yntema and Mrosovsky, 1982). Out of 54 data loggers deployed, 33 were washed away during storms. Data from the remaining 21 data loggers indicated that the heavy rainfall from the storm events decreased incubation temperatures (Figure 4). Heavy rainfall during incubation may influence the sex of the hatchlings, consequently altering population dynamics.

The Keewaydin Island shoreline has been mapped annually since 1997 in effort to document shoreline change. The shoreline is also mapped after significant storm events. Mapping is done by collecting GPS (Global Positioning System) locations along the dune-line and then downloaded using GIS (Geographic Information System) software. Figure 5 illustrates the shoreline change from March to October 2001.

Literature Cited

Mrosovsky, N. 1988. Pivotal temperatures for loggerhead turtles *(Caretta caretta*) from northern and southern nesting beaches. *Canadian Journal of Zoology* 66:661-669.

Yntema, C.L. and N. Mrosovsky. 1982. Critical periods and pivotal temperatures for sexual differentiation in loggerhead sea turtles. *Canadian Journal of Zoology* 60:1012-1016.

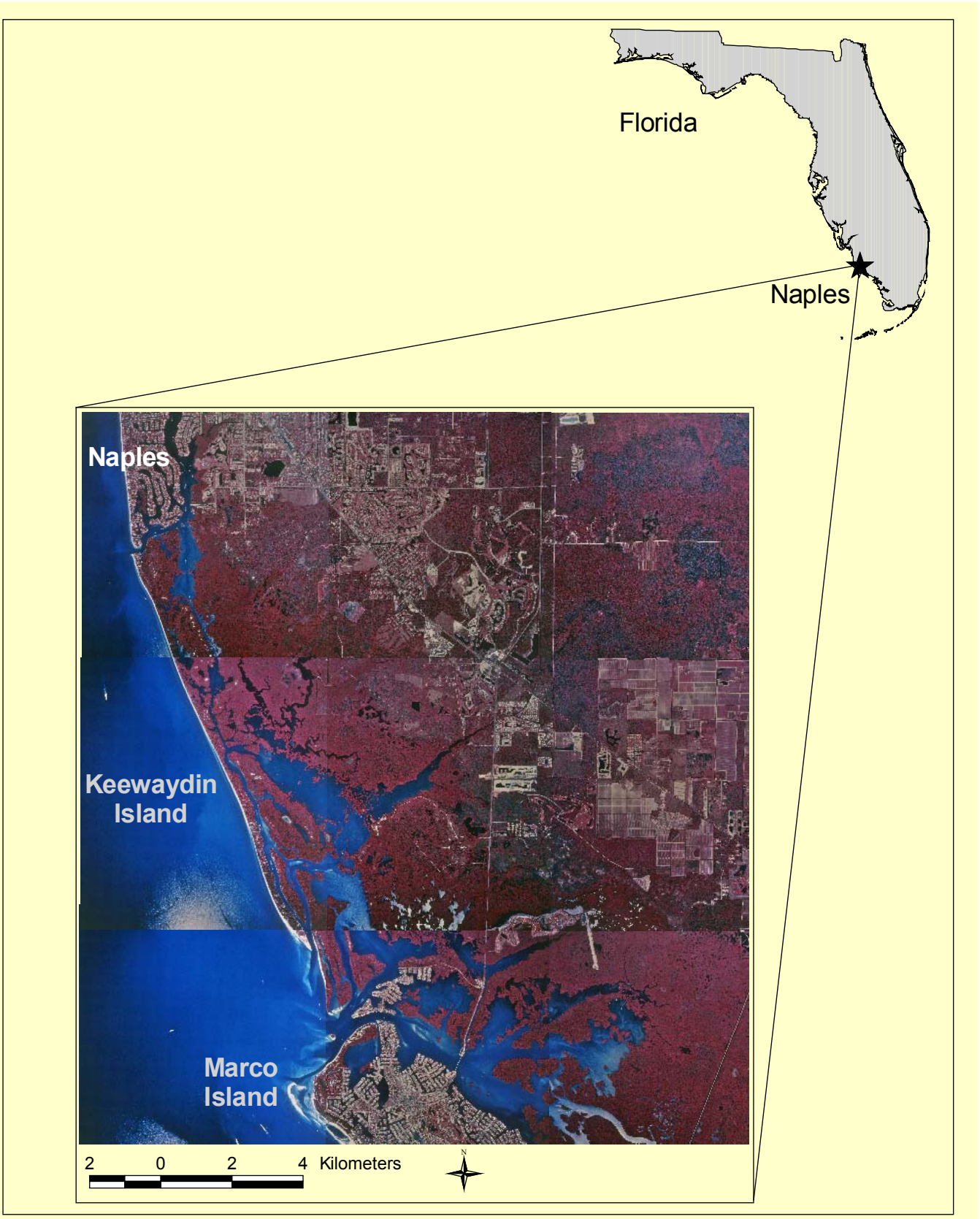

Figure 1. Location of Keewaydin Island, Collier County, Florida.

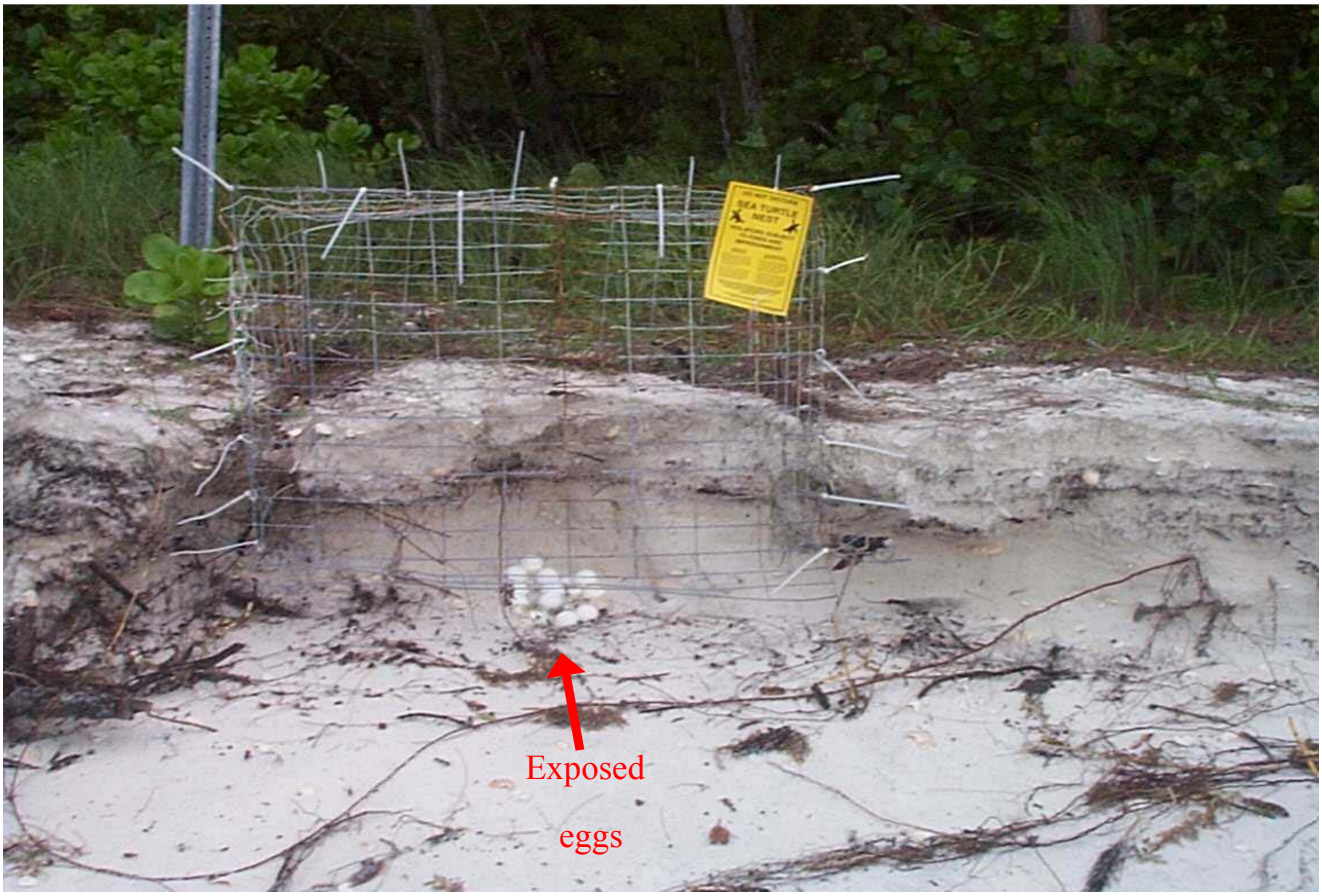

Figure 2. The 2001 storm events washed away beach leaving eggs exposed.

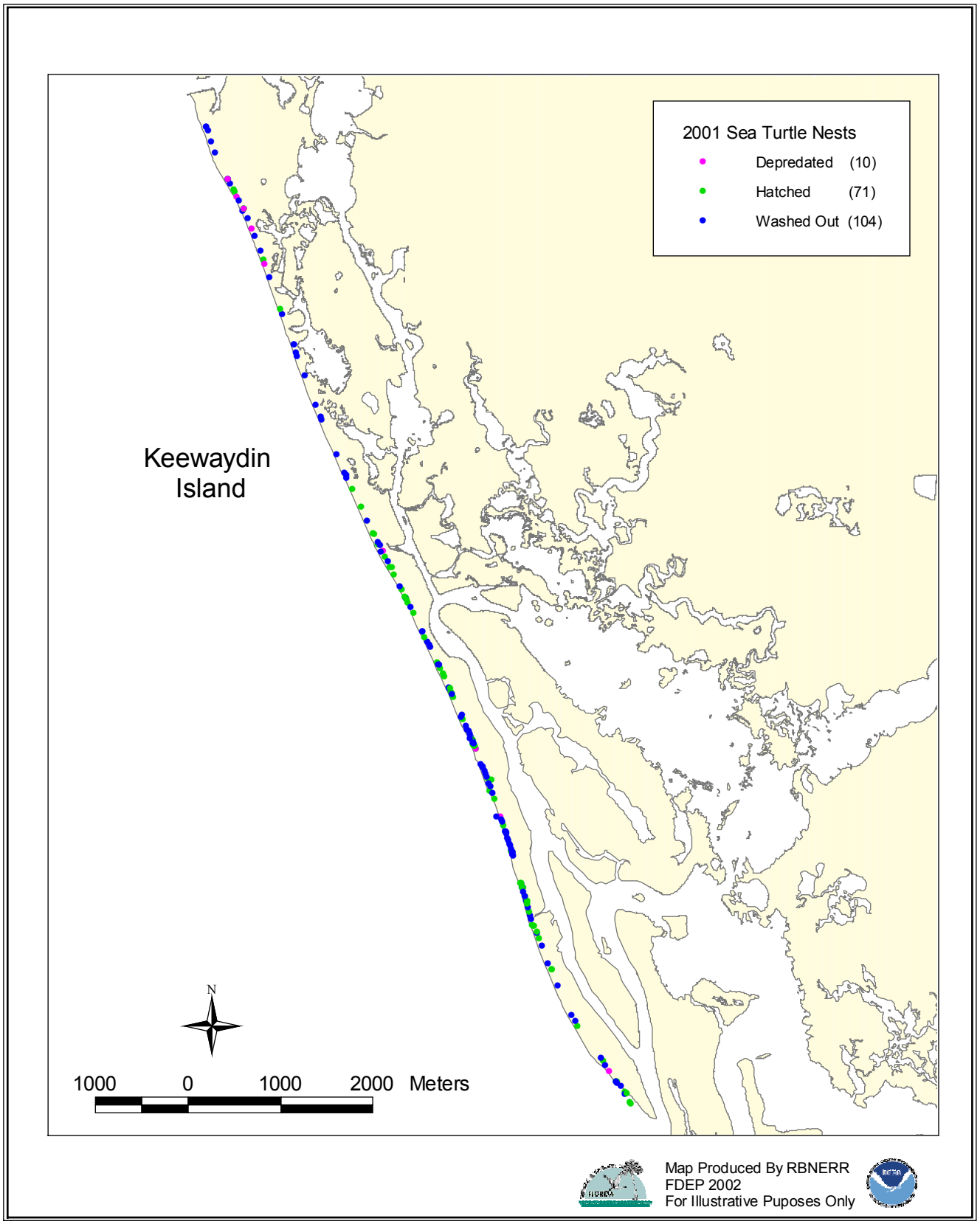

Figure 3. Illustration of the 2001 sea turtle nests on Keewaydin Island, Florida.

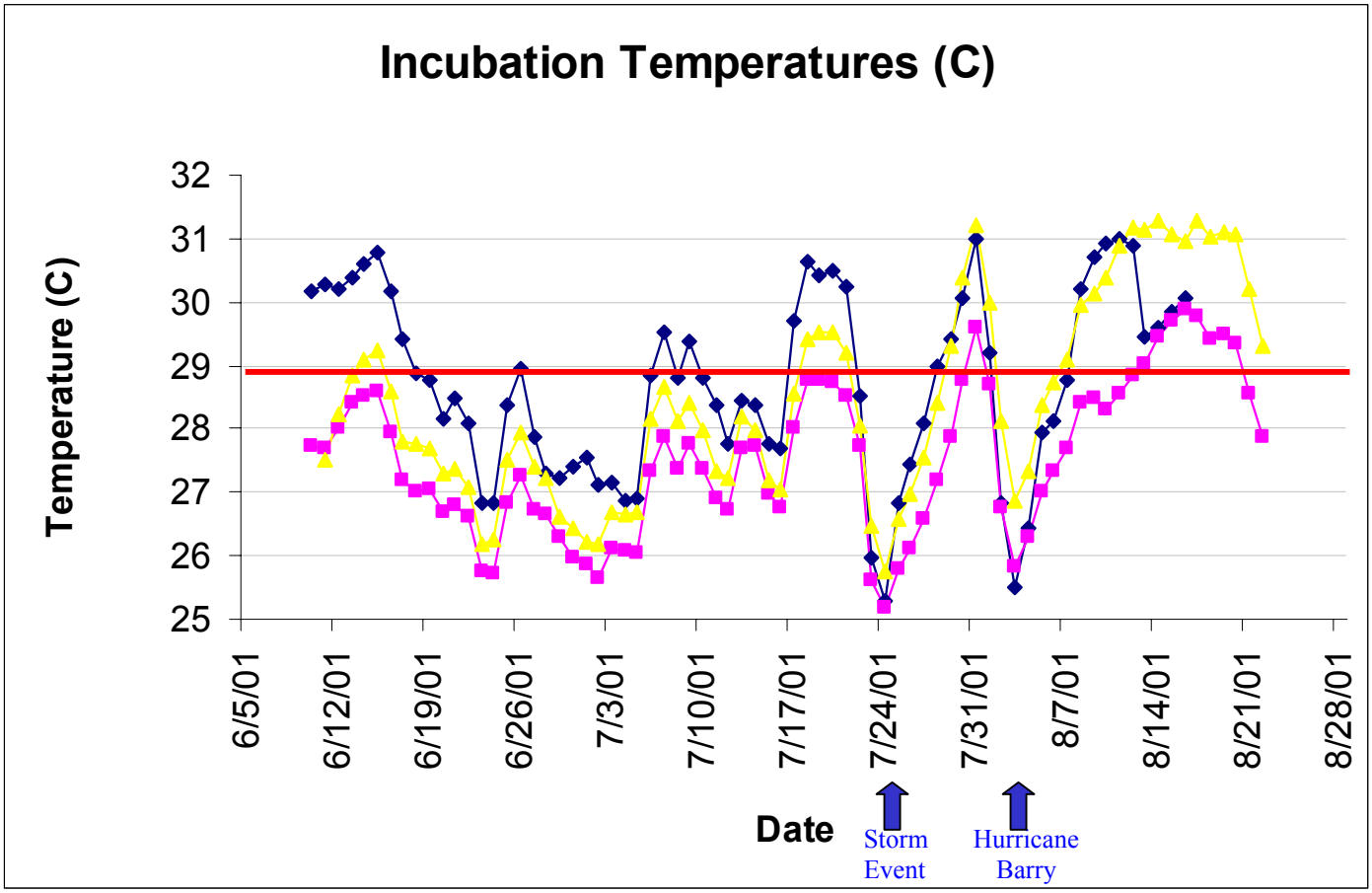

Figure 4. Incubation temperatures of three different nests on Keewaydin Island during the 2001 turtle season.

Figure 5. Keewaydin Island shoreline change after the 2001 storm events.