Chapter Three

CASE STUDY: CAMP ELLIS/FERRY BEACH

A. INTRODUCTION

The analysis in the preceding chapter presents a rough estimate of impacts of a change in shoreline position for several sites, using readily available information. Clearly, more quantitative assessments of impacts would be possible given additional data or staff resources. As an illustration of the potential for more detailed analysis, the research team opted to undertake a more quantitative assessment of the features at risk from accelerated sea-level rise for the Camp Ellis area. This type of more quantitative assessment was made possible by the availability of existing data on a Geographic Information System (GIS). The information presented in this chapter serves as the foundation for the cost-benefit analysis of alternative response strategies for Camp Ellis, presented in Chapter Four.

B. SHORELINE POSITION

Camp Ellis is a spit which projects southward into the Saco River in the City of Saco. To the north it becomes attached to the mainland and is called Ferry Beach. (*Figures 2.15, 3.1*). The area, with the exception of a small state park, is highly developed. Residences are set back among extensive sand dunes near Ferry Beach, but commercial structures as well as residences cover the former dunes and crowd onto the beach at Camp Ellis (Kelley et al., 1989). (*Figures 3.2, 3.3*)

This area has experienced both progradation and erosion in the course of the past century. Following the initial dredging of the Saco River, and construction of a jetty at Camp Ellis, the beach grew seaward. This may have been a response to the placement of dredged spoils on the beach, because in the early 20th century, the new land eroded along with many buildings and a railroad line (USACOE, 1992).

The USACOE has predicted a retreat rate of about 1 m (3 feet) per year for that portion of Camp Ellis lacking an integrated seawall, and 0.6 m (2 feet) per year for the area behind a massive granite seawall fronting Surf Street (USACOE, 1992). (*Figure 3.4*) These predictions are based on examination of historical maps and aerial photographs. To date the predictions have been relatively accurate for the area lacking massive engineering structures,

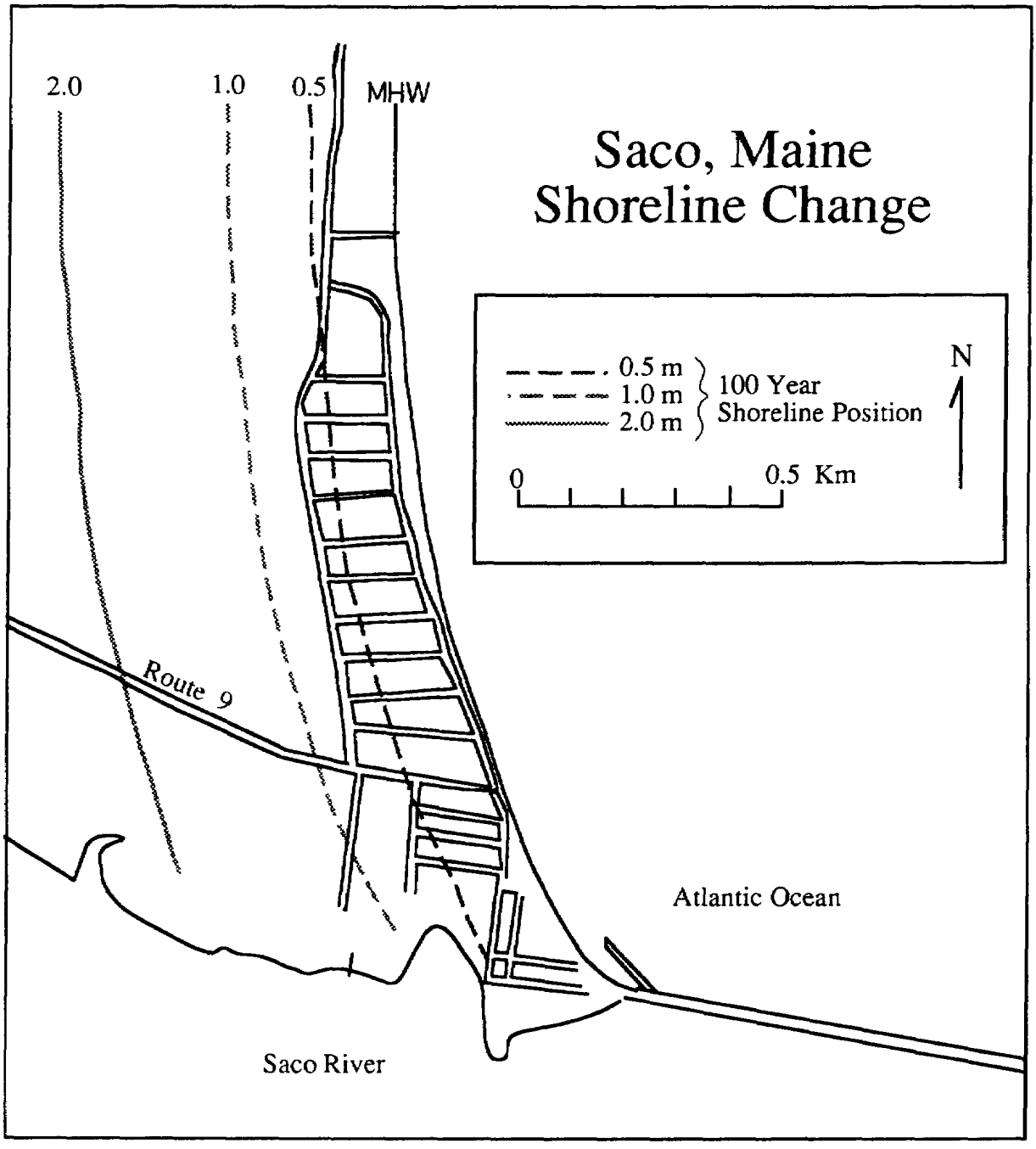

Figure 3.1. Projected shoreline change map for Camp Ellis. Mapped shorelines consider only erosion from the ocean side, not from the Saco River side. Mapped shorelines do not consider the addition of new sand from the Saco River.

Figure 3.2. Photograph of the Camp Ellis-Ferry Beach area. Development on beach at Camp Ellis.

Figure 3.3. Photograph of the Camp Ellis-Ferry Beach area. Undeveloped back dune at Ferry Beach State Park.

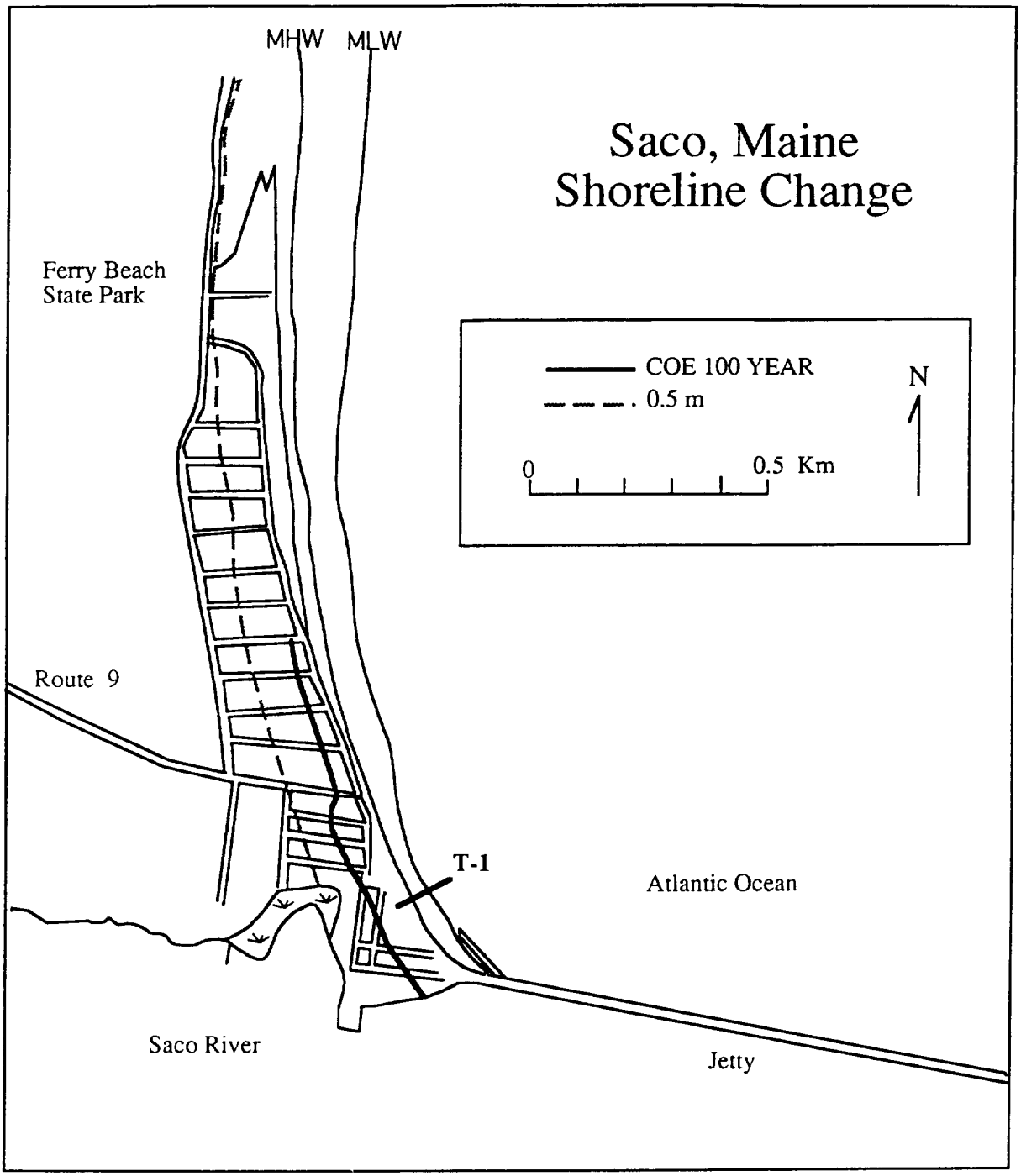

Figure 3.4. Shoreline change map of Camp Ellis comparing 0.5 m shoreline from this study with U.S. Army Corps of Engineers predictions. The Army prediction is a continuation of trends up until 1955.

and one or more houses per year have been lost to the sea. The large seawall on Surf Street has repeatedly been destroyed by storms also, but has been rebuilt in the same place, and so no erosion of the land behind it has occurred. There is no longer a beach in front of the wall, however, except at low tide (Kelley et al., 1989).

The USACOE's data do not apply to Ferry Beach, and their predictions are only shown to the end of the Surf Street seawall. (*Figure 3.4*) Although the height of most of the private seawalls as well as the Surf Street seawall is greater than 2 m above higher high water (*Figure 3.5*), in a dynamic beach setting the walls are likely to be undermined or destroyed by waves in the future, and it is reasonable to assume the beach will retreat. The 150 m, 300 m and 600 m predicted shorelines associated with the 0.5 m, 1.0 m, and 2.0 m higher sea levels, respectively, reflect this assumption. (*Figure 3.1*, *Table 2.1*) No consideration is given to the impact of sand redistribution as a result of the projected sea-level rise, nor of the effect of paved roads, sewer lines and parking lots.

C. IMPACT ASSESSMENT

1. Upland Impacts

Substantial impacts are projected on natural and built features. Figures 3.6, 3.7 and 3.8 show the projected sea-level rise scenarios along with settlement patterns, land use, location of natural features, and infrastructure. It should be noted that mapped shorelines consider only erosion from the ocean side, not from the Saco River side. There has been insufficient study of the impact of sea-level rise on rivers to project shoreline change along the river.

The projected .5 meter sea-level rise boundary is about 150 meters (500 ft.) landward of current mean high water. Under this scenario, public and private properties at risk include the following:

- 71 acres of land developed with 210 structures
- 2.4 miles of public roads
- 2.3 miles of water lines
- 1.8 miles of sewer lines
- Municipal fire sub-station
- State Park lands

The 1.0 meter sea-level rise projection creates a new land/sea boundary about 300 meters (1,000 ft) from current mean high water. Features at risk under this scenario include the following:

- 133 acres of land, developed with 334 structures
- 4.25 miles of public roads
- 3.6 miles of water lines
- 3.4 miles of sewer lines
- Fire sub-station
- State Park lands

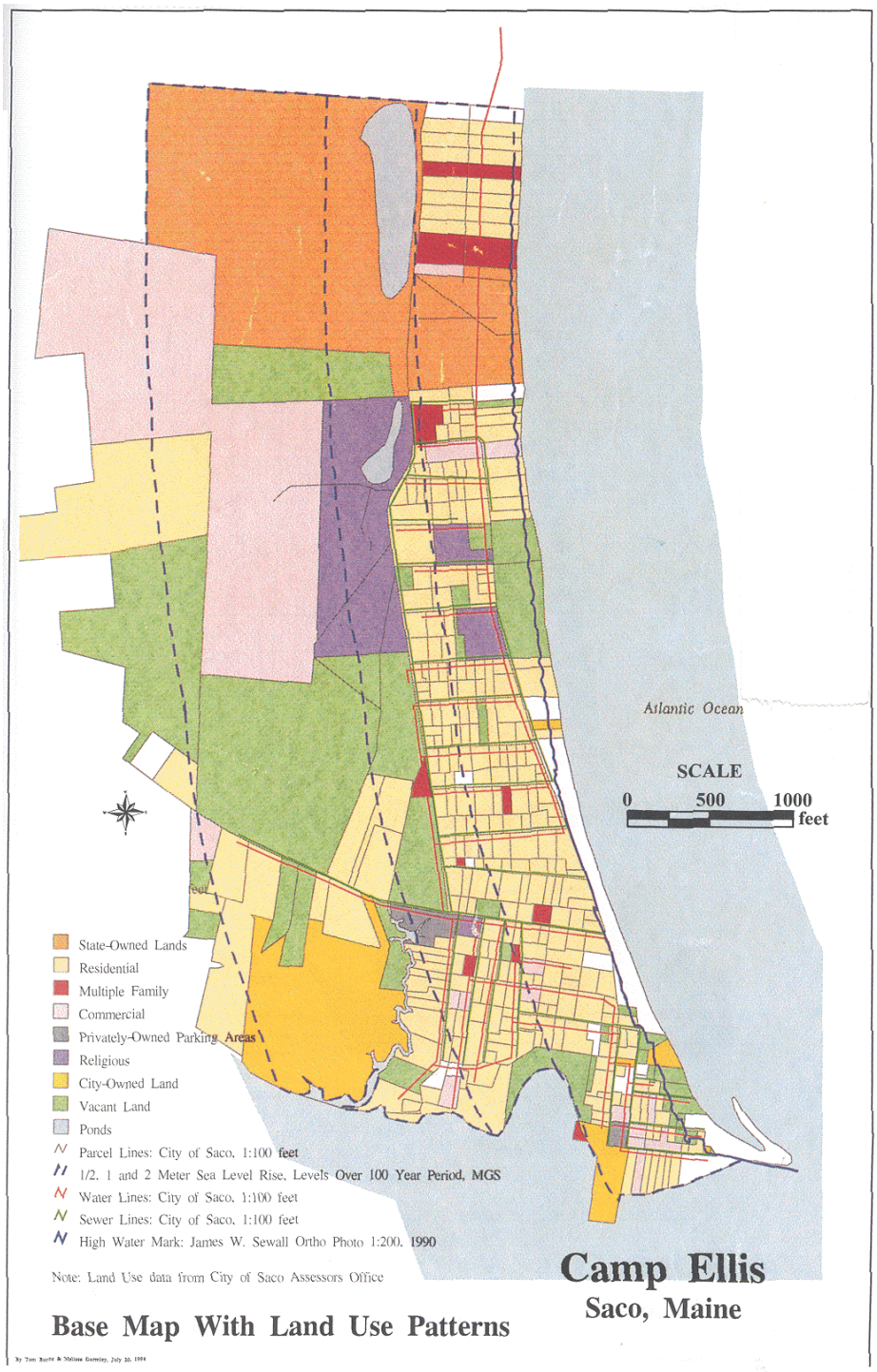

Figure 3.5. Camp Ellis, Saco, Maine. Settlement patterns and wetlands.

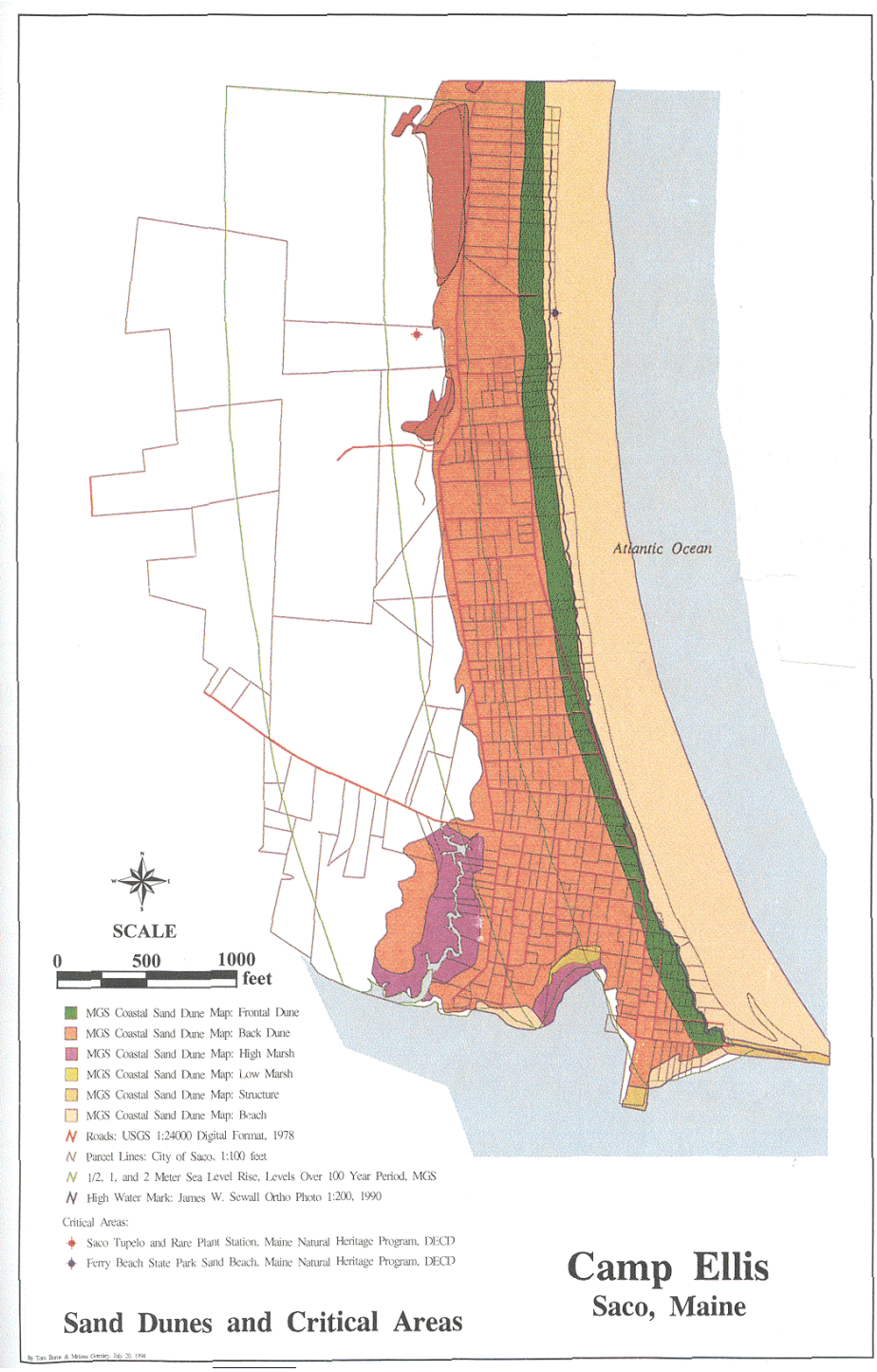

Figure 3.6. Camp Ellis, Saco, Maine. Sand dunes and critical areas.

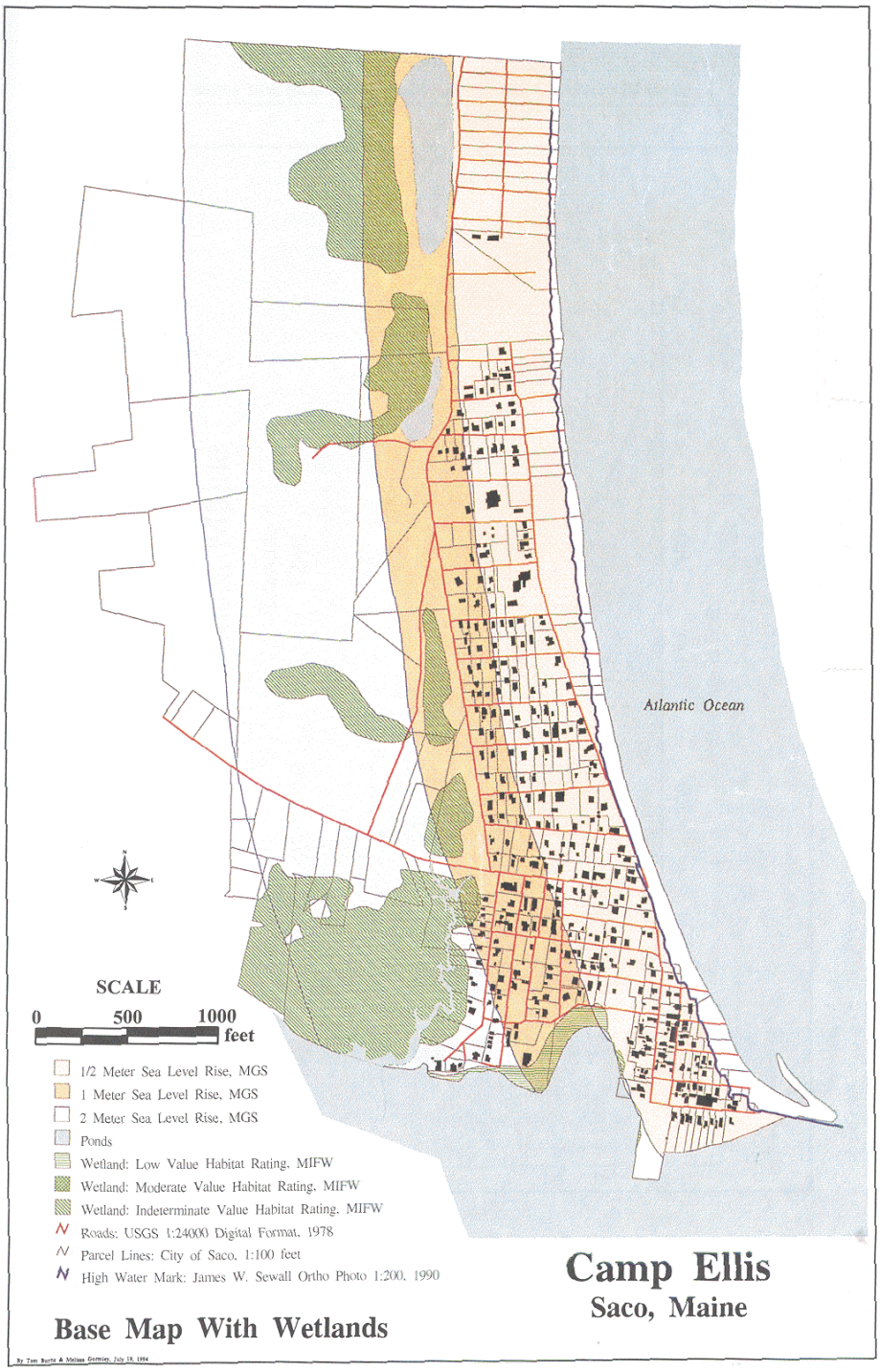

Figure 3.7. Camp Ellis, Saco, Maine. Land use and public infrastructure.

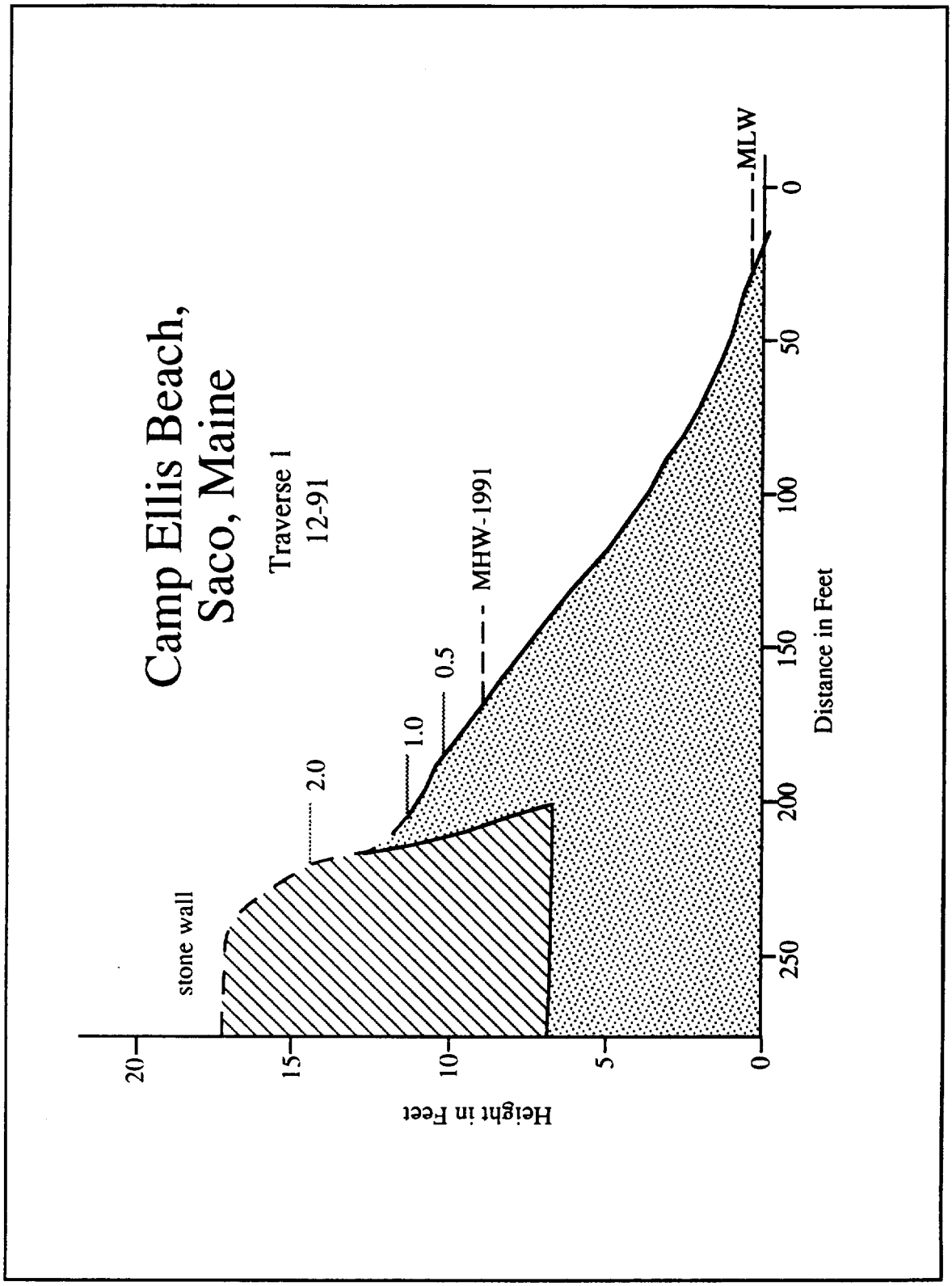

Figure 3.8. Camp Ellis, Saco, Maine. Land use and public infrastructure.

The 2.0 meter sea-level rise boundary is 600 meters (2,000 ft.) inland from current mean high water. Features at risk under this scenario include:

- 260 acres of land developed with 364 structures
- 4.7 miles of public roads
- about 4 miles of water lines
- 3.6 miles of sewer lines
- Fire sub-station
- State Park lands

2. Value of Land and Structures

According to City of Saco assessors records, property values in the .5 meter rise area total about $37.6 million. The value of properties inundated under the 1.0 meter sea-level rise scenario is roughly $55.2 million. Under the 2.0 meter rise, the value of land and buildingsinundated reaches about $61.3 million. The difference between the value of properties affected under the 1.0 and 2.0 meter rise is not that sizable, due to the largely undeveloped nature of the land within the 2.0 meter band, and the presence of wetlands.

3. Wetland Impacts

Wetland acreages that may be impacted by rising sea-level in the Camp Ellis/Ferry Beach area are as follows:

	.5 meter	1.0 meter	2.0 meters
Wetland Acreages	< 1 acre	21 acres	57 acres

Most of the wetlands in the Camp Ellis site are tidally influenced freshwater wetlands. All are classified as having low, moderate or indeterminate value for habitat. It was beyond the scope of this study to determine how freshwater wetlands might react to rising sea-level. However, it should be noted that it is expected that they would undergo slow conversion to salt marsh, and would probably be inundated during the 2.0 meter rise.

4. Extent of Similarly Situated Land in the Region

Roughly 10% of shoreline of the Casco and Saco Bay regions is made up of sand beaches. As explained previously in Chapter Two, potential shoreline changes in sand beach areas of between 50-600 meters (175 ft.-2,000 ft.) can be anticipated, depending on the sea-level rise scenario being considered.

While the mapped sites described in this and the preceeding chapter (Camp Ellis/Ferry Beach, Old Orchard Beach and Pine Point) are the largest beaches in the study area and probably provide the best examples of how developed beach areas may be affected, other sand beaches in the study region may be similarly affected. Scarborough Beach, Higgins Beach, Crescent Beach and Willard Beach, because of their moderate slopes, may experience shoreline changes similar to those mapped for Old Orchard and Camp Ellis. The coastal lands adjacent to East End Beach and Mackworth

Island beaches, having much steeper slopes, will experience less dramatic movement of the shoreline.

Sand beaches also occur on Casco Bay's larger islands. Again, slope conditions on the adjacent shoreline will help to determine the landward extent of sea-level rise in these areas.

In addition to being heavily used for public recreation, the majority of the sand beaches in the mainland portion of the study area are developed in residential uses. Even where state park status protects an area of sandy beach, the actual area of state ownership typically is small, and developed areas surround park lands. Since densities of development around the region's sand beaches vary, Camp Ellis/Ferry Beach, with its mix of high density cottages and moderate density estates may provide a useful comparison of potential property losses.

In addition to property losses, recreational value must be considered when evaluating potential impacts of sea-level rise on sand beaches. Using available statistics for state park usage in the region and Colgan's (1990) estimates of the value of the recreational experience, the recreational value of three sand beaches mapped in the study area would be between $.5 million and $4.25 million each year. Visitor estimates at municipal beaches and privately owned areas would have to be added to these figures to determine a total value for the region.

5. Analysis

There continues to be ongoing debate and discussion surrounding the fate of Camp Ellis. Shorefront landowners, concerned about saving their property from the sea, have banded together under the umbrella of "Save Our Shores." Upland owners are more concerned about the costs to the town taxpayers of continuing to fight a losing battle with the sea. The City of Saco is currently considering abandoning Surf Street, the street that is continually undermined during coastal storms. Some others are concerned about the proper role for local, state, and federal agencies. Presently, the U.S. Army Corps of Engineers is studying the possible relationship between the jetty and coastal erosion, while the City and State are discussing a potential buyout of shorefront properties. This controversy is illustrative of the questions other communities will face if coastal erosion accelerates.

D. REFERENCES

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