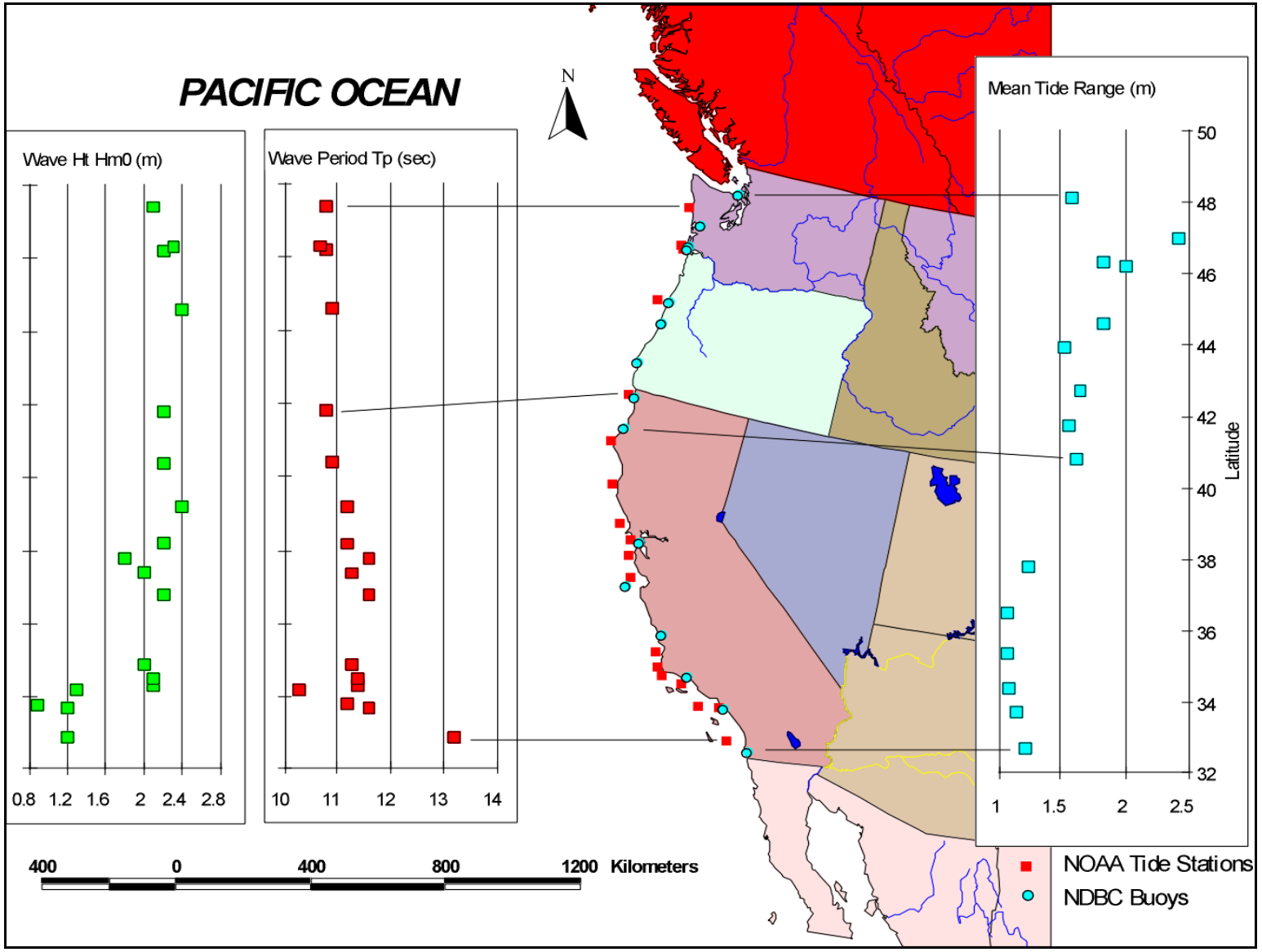

Figure I-2-14. Pacific coast tide and wave characteristics. The southernmost buoy shows high wave period because of the influence of swell waves and sheltering from wind waves provided by offshore islands

Figure I-2-15. Pocket beach just north of Laguna Beach, southern California (April 1993). Poorly consolidated sandstone and conglomerate bluffs in this area are highly vulnerable to erosion, jeopardizing exclusive residential properties. Erosion is caused by storm waves and groundwater runoff

beach fills, and numerous urban areas around the country (Los Angeles, New York, Galveston, Chicago, Miami, Palm Beach).

I-2-4. Erosion

In order for one shore to accrete, often some other shore must erode. Erosion is a natural response to the water and wind processes at the shore, but erosion is only a problem when human development is at risk. Sometimes, man-made alterations to the littoral system, including modifications to sediment sources or sinks, may contribute to the eroded condition. The National Shoreline Study (DOA 1971) found that 24 percent of the entire United States shore of 135,000 km (84,000 miles) is undergoing significant erosion where human development was threatened. If Alaska, with its 24,800 km. (15,400 miles) of shore is removed from the statistic, 42 percent of the United States shore is experiencing significant erosion!

I-2-5. Solutions

There are no absolute rules, nor absolute solutions to the problem of coastal erosion given the dynamic and the diverse character of the shoreline. No single set of regulations, or single land use management philosophy, is appropriate for all coastal situations or settings. The diversity of the coasts requires consideration of a variety of solutions when addressing problems in a particular area. Solutions can be classified into five broad functional classes of engineering or management, as listed in Table I-2-2. These options are explored in detail in Part V of the CEM.

Figure I-2-16. Mouth of the Siuslaw River, southern Oregon near the town of Florence (December 1994; view looking south). This and other Federal navigation projects on the Oregon and Washington coasts are difficult and expensive to maintain because of high wave energy and a short construction season. The scale of these Pacific projects is difficult to appreciate from aerial photographs: the Siulslaw rubble-mound jetties, first built in 1917, are 180 m apart and the north jetty is 2300 m long. The shore in this area consists of long barrier spits interrupted with rocky headlands

Table I-2-2
Alternatives for Coastal Hazard Mitigation

Functional Class	Approach Type
1. Armoring structures	Seawall
	Bulkhead
	Revetment - revetment
2. Beach stabilization structures and facilities	Breakwaters (including artificial headlands)
	Groins
	Sills vegetation
	Groundwater drainage
3. Beach restoration	Beach nourishment
	Sand passing
4. Adaptation and accommodation	Flood proofing
	Zoning
	Retreat
5. Combinations	Structural and restoration
	Structural and restoration and adaptation
6. Do nothing	(no intervention)

Abbreviated from CEM Part V, Table V-3-1