

**HIGH WATER MARKS AND BEACH PROFILES ON
THE NORTH CAROLINA COAST FOLLOWING
HURRICANE BERTHA, JULY 12, 1996**

U.S. Geological Survey, Water Resources Division

Raleigh, North Carolina

August 1996

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On the evening of July 12, 1996, Hurricane Bertha, the first Atlantic hurricane of 1996, made landfall near Topsail Island, N.C. According to the National Weather Service (NWS), Hurricane Bertha was a "category 2" hurricane at landfall with maximum sustained winds of 105 miles per hour (mph). By 3:00 a.m. on July 13, Hurricane Bertha had moved northward through the State and was downgraded by the NWS to a tropical storm with maximum sustained winds of 65 mph.

The U.S. Geological Survey (USGS) responded by sending 11 field crews to eastern North Carolina on July 13 to mark high water from the storm surge. On July 25, 1996, the Federal Emergency Management Agency (FEMA) issued the USGS a Mission Assignment (Mission Assignment Letter FEMA-1127-DR-NC; Mission USGS-01) to survey and map high-water marks and beach profiles following the hurricane. Specifically, the assignment contains two tasks:

Task 1 -- High-Water Marks (HWM's)

Survey recoverable HWM's in the following counties (with the maximum number of recoverable HWM's listed):

- New Hanover County - 12 HWM's
- Pender County - 7 HWM's
- Onslow County - 13 HWM's
- Carteret County - 4 HWM's
- Beaufort County - 30 HWM's

Data are to be provided in accordance with the FEMA Study Contractors' Guide. Elevations are to be referenced to National Geodetic Vertical Datum of 1929 (NGVD). Tables with descriptions of the HWM's, elevations, benchmarks used, and the confidence of the HWM's are required.

Task 2 -- Beach Profiles

Survey 36 beach profiles for the following coastal communities and the estimated number of beach profiles:

- Kure Beach, New Hanover County - 2 Profiles
- Wilmington Beach, New Hanover County - 2 Profiles
- Carolina Beach, New Hanover County - 3 Profiles
- Figure Eight Island, New Hanover County - 3 Profiles
- Wrightsville Beach, New Hanover County - 4 Profiles
- Topsail Beach, Pender County - 2 Profiles
- Surf City, Pender County - 2 Profiles
- North Topsail Beach, Onslow County - 4 Profiles
- Emerald Isle, Carteret County - 6 Profiles

- Indian Beach, Carteret County - 2 Profiles
- Pine Knolls, Carteret County - 2 Profiles
- Atlantic Beach, Carteret County - 4 Profiles

Beach profile data are to be provided on a digital plot and also in tabular form.

The USGS successfully recovered 61 of the 66 originally identified HWM's in 5 counties (figure 1), and completed all 36 of the beach profiles. All field work was done in cooperation with the FEMA contractor, Woodward-Clyde and Associates under the direction of Dan Deegan (Atlanta, Ga office).

High-Water Marks

HWM's were identified on July 13, 1996. Marks were preserved with driven stakes, felt-tip pen lines drawn on structures, or small disks nailed into walls. Each HWM was described by its location, type, and quality, and usually was photographed. The "type" described the nature of the mark -- debris line, seed line, etc. The "quality" of the measurement was judged by field personnel based on the following: a mark was judged "excellent" if the high-water level was estimated to be within 0.05 feet (ft) of the mark's elevation; "good" if within 0.1 ft; "fair" if within 0.25 ft; or "poor" if greater than 0.25 ft.

A total of 61 HWM's were recovered and surveyed. HWM's were surveyed in New Hanover County (8 HWM's), Pender County - (5 HWM's), Onslow County (10 HWM's), Carteret County (3 HWM's), and Beaufort County (35 HWM's). These data are presented in the attached tables, organized by County, and located on the attached USGS 7.5-minute Quadrangle maps

Surveying was done with a total station instrument. Complete level circuits were run to each HWM, and closure error was within third-order accuracy standards. Horizontal locations in New Hanover, Pender, Onslow, and Carteret Counties were determined using a global positioning instrument accurate to 4 meters.

Beach Profiles

Beach profiles were completed during July 26 - August 16. Profiles were completed on or near locations requested by Woodward-Clyde and Associates. Profiles are distributed by county as described in the task orders above. Surveys were completed by total station instrument. Profiles were run from the centerline of the first road (Station 0.0 ft), across the dunes, and into the surf. Detailed information on the location of Station 0.0 is available upon request. Beach profiles are presented by county in the attached plots, with raw data (station and elevation) in the accompanying tables.

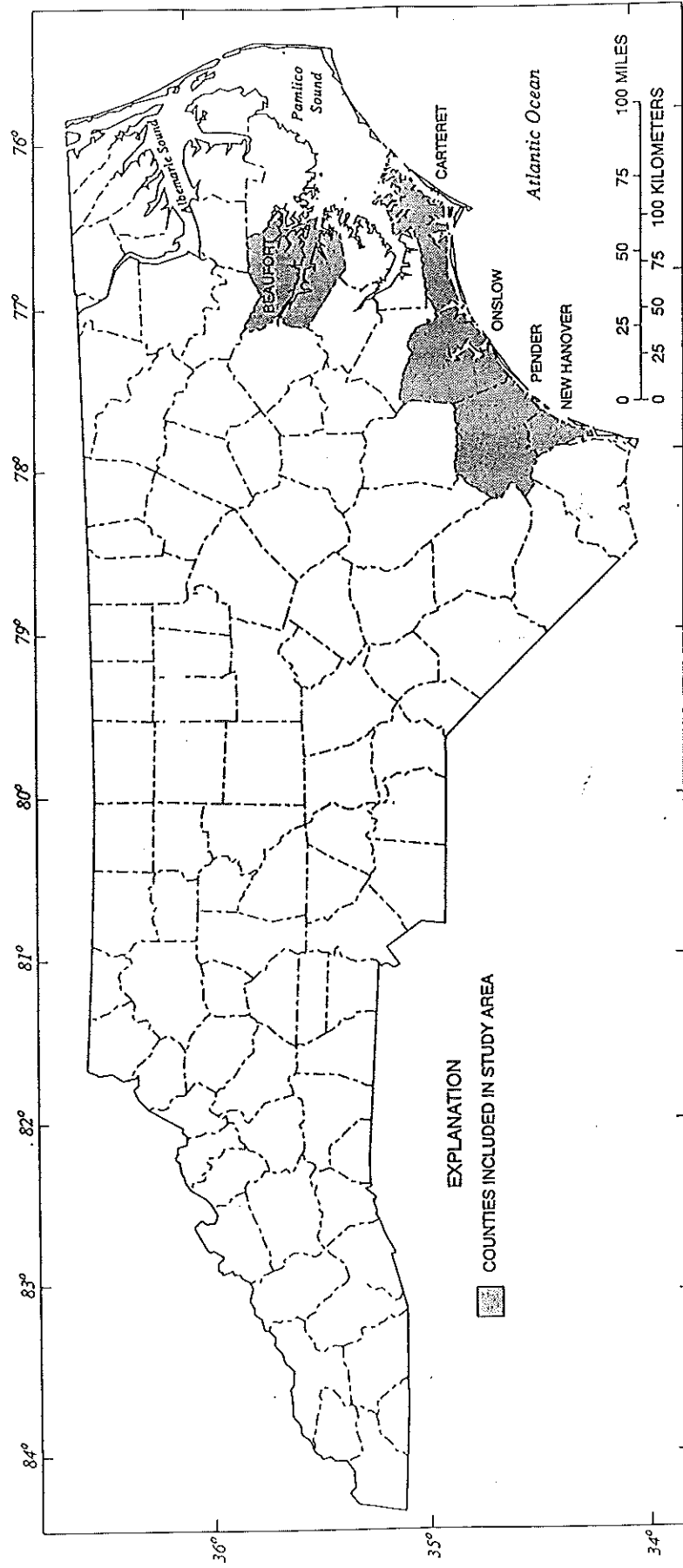


Figure 1 -- Counties where high-water marks were identified and beach profiles were completed following landfall of Hurricane Bertha on July 12, 1996.

Data Attachments

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**HURRICANE BERTHA
HIGH-WATER MARKS and
BEACH PROFILE SURVEY**

Locations and descriptions of high-water marks (HWM's) and water- and ground-surface elevations for the Hurricane Bertha flood, New Hanover County, North Carolina, July 13, 1996

[NAD 27, North American Datum 1927; NGVD, National Geodetic Vertical Datum 1929; NCGS, North Carolina Geodetical Survey; COE, Corps of Engineers; GIP, galvanized iron pipe; N/A, not applicable; AIWW, Atlantic Intracoastal Waterway; TBM, temporary benchmark]

| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|-------|--------------------------|---|-------------------|--------------------|--------------------------------|-------------------------|----------------------------|---------------------------------------|
| NH-4 | Scotts Hill | In front of lots 56 and 54, Beach Road South, Figure Eight Island. Debris line. | 34° 15' 43.60" | 77° 45' 04.93" | debris line fair (+/- 0.25) | NCGS monument, Barracks | 8.044 | not measured |
| NH-5 | Scotts Hill | Lot 54, Beach Road South, Figure Eight Island. Mud-line in bathroom under home. | 34° 15' 45.27" | 77° 45' 00.76" | mud line good (+/- 0.10) | NCGS monument, Barracks | 14.199 | not measured |
| NH-8 | Carolina Beach | 1800 Canal Drive, Carolina Beach, NC. In Ocean Villas Condo parking bay # 28, mudline on support post. | 34° 03' 23.20" | 77° 52' 53.21" | mud line good (+/- 0.10) | COE 135 + 00.01 GIP | 9.748 | 9.615 |
| NH-9 | Carolina Beach | Island North Condos, Carolina Beach, NC, on the corner of Salt Marsh Lane and Canal Drive, mudline adjacent to room #4. | 34° 03' 27.82" | 77° 52' 53.73" | mud line good (+/- 0.10) | COE 135 + 00.01 GIP | 6.752 | 6.287 |
| NH-11 | Carolina Beach | 1507 Carolina Beach Avenue. | 34° 03' 08.95" | 77° 52' 59.89" | debris line fair (+/- 0.25) | USGS PK-42 | 7.769 | 7.536 |
| NH-13 | Scotts Hill | Behind Lot 57 Beach Road South, Figure Eight Island sound. Debris line, (continuous) south end. | 34° 15' 45.69" | 77° 45' 07.80" | debris line fair (+/- 0.25) | NCGS monument, Barracks | 8.135 | N/A |

Locations and descriptions of high-water marks (HWM's) and water- and ground-surface elevations for the Hurricane Bertha flood, New Hanover County, North Carolina, July 13, 1996

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| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|-------|--------------------------|---|-------------------|--------------------|--------------------------------|-------------------------|----------------------------|---------------------------------------|
| NH-14 | Scotts Hill | Behind Lot 57 Beach Road South, Figure Eight Island sound. Debris line, (continuous) North end. | 34° 15' 48.76" | 77° 45' 05.27" | debris line fair (+/- 0.25) | NCGS monument, Barracks | 7.916 | N/A |
| NH-15 | Scotts Hill | Lot 122 Beach Road South, Figure Eight Island. Debris line. | 34° 15' 18.71" | 77° 45' 24.77" | debris line poor (> 0.25) | Monument, Foster | 6.422 | N/A |

Locations and descriptions of high-water marks (HWM's) and water- and ground-surface elevations for the Hurricane Bertha flood, Pender County, North Carolina, July 13, 1996

[NAD 27, North American Datum 1927; NGVD, National Geodetic Vertical Datum 1929; NCGS, North Carolina Geodetical Survey; COE, Corps of Engineers; GIP, galvanized iron pipe; N/A, not applicable; AIWW, Atlantic Intracoastal Waterway; TBM, temporary benchmark]

| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|-------|--------------------------|---|-------------------|--------------------|--------------------------------|----------------------------|----------------------------|---------------------------------------|
| PEN-2 | Hampstead | 814 Carolina Ave., Topsail Beach, NC. Seedline on rear of home. | 34° 21' 39.91" | 77° 38' 13.31" | seed line excellent (+/- 0.05) | COE 89 + 62.91 GIP | 5.537 | 4.707 |
| PEN-3 | Hampstead | 1205 Carolina Ave., Topsail Beach, NC. Seedline on side of home. | 34° 21' 42.21" | 77° 38' 11.21" | seed line good (+/-0.10) | NCGS monument Crocker | 5.805 | 4.075 |
| PEN-4 | Hampstead | Across Ocean Blvd. in front of 1704 and 1706. Debris line. | 34° 21' 00.73" | 77° 38' 50.80" | debris line poor (> 0.25) | COE 27 + 23.03 GIP | 6.514 | N/A |
| PEN-5 | Hampstead | In front of Sea Vista Hotel Ocean Blvd. Topsail Beach, NC. Debris line. | 34° 21' 12.42" | 77° 38' 40.31" | debris line poor (> 0.25) | COE 27 + 23.03 GIP | 8.690 | 8.000 |
| PEN-7 | Holly Ridge | Behind One Stop Seafood Restaurant, Hwy 50. Debris line. | 34° 25' 51.20" | 77° 33' 02.80" | debris line fair (+/- 0.25) | COE monument AIWW SC SB 27 | 4.479 | 4.449 |

Locations and descriptions of high-water marks (HWM's) and water- and ground-surface elevations for the Hurricane Bertha flood, Onslow County, North Carolina, July 13, 1996

[NAD 27, North American Datum 1927; NGVD, National Geodetic Vertical Datum 1929; NCGS, North Carolina Geodetical Survey; COE, Corps of Engineers; GIP, galvanized iron pipe; N/A, not applicable; AIWW, Atlantic Intracoastal Waterway; TBM, temporary benchmark]

| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|------|--------------------------|---|-------------------|--------------------|--------------------------------------|--------------------------|----------------------------|---------------------------------------|
| ON-1 | Holly Ridge | 1711 North Shore Drive, North Topsail Beach, N.C. Seedline on support beam. | 34° 26' 30.80" | 77° 31' 06.67" | seed line good (+/- 0.10) | NCGS monument Pen 1 | 8.657 | 7.919 |
| ON-2 | Holly Ridge | Phillips 66 gas station, Hwy. 210 and First St., behind gas station on back deck near storage locker. | 34° 26' 33.18" | 77° 31' 11.31" | seed line good (+/- 0.10) | NCGS monument Pen 1 | 4.425 | 3.715 |
| ON-3 | Holly Ridge | 1021 First Street, North Topsail Beach. Debris line in front yard. | 34° 26' 39.81" | 77° 31' 14.00" | debris line poor (> 0.25) | NCGS monument Pen 1 | 3.903 | N/A |
| ON-5 | Holly Ridge | On the corner of 4th St. and Hwy. 210, debris line in yard near mobile home. | 34° 26' 41.86" | 77° 30' 51.96" | debris line poor (> 0.25) | NCGS monument Pen 1 | 5.974 | N/A |
| ON-6 | Holly Ridge | In front of canal near intersection of 5th St. and Hwy. 210. | 34° 26' 45.77" | 77° 30' 53.76" | debris line poor (> 0.25) | NCGS monument Pen 1 | 4.475 | N/A |
| ON-8 | Spicer Bay | 2798 Hwy. 210, on the corner of Chesnut Street and Hwy. 210. Seedline on house in storage area. | 34° 27' 29.30" | 77° 29' 27.51" | seed line excellent (+/- 0.05) | NCGS monument Public | 9.310 | 9.081 |
| ON-9 | Spicer Bay | 1 block east of the corner of Hwy. 210 and 14th Street, unnamed road #6412, washline under home. | 34° 28' 08.37" | 77° 28' 09.42" | wash line good (+/- 0.10) | NCGS monument Bernuda | 9.210 | 9.003 |

Locations and descriptions of high-water marks (HWM's) and water- and ground-surface elevations for the Hurricane Bertha flood, Onslow County, North Carolina, July 13, 1996

[NAD 27, North American Datum 1927; NGVD, National Geodetic Vertical Datum 1929; NCGS, North Carolina Geodetical Survey; COE, Corps of Engineers; GIP, galvanized iron pipe; N/A, not applicable; AIWW, Atlantic Intracoastal Waterway; TBM, temporary benchmark]

| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|-------|--------------------------|---|-------------------|--------------------|--------------------------------|---|----------------------------|---------------------------------------|
| ON-11 | New River Inlet | 1234 New River Inlet Road, south side of stairwell, mud-line. | 34° 30' 22.41" | 77° 23' 19.40" | mud line excellent (+/- 0.05) | USGS PK-16 from NCGS monument, View Azimuth | 7.983 | 7.12 |
| ON-12 | New River Inlet | 1615 New River Inlet Road, behind home on boat house. | 34° 30' 35.59" | 77° 22' 50.87" | wash line good (+/- 0.10) | USGS PK-14 from NCGS monument, View Azimuth | 5.187 | not measured |
| ON-13 | New River Inlet | 2346 River Road at entrance to New River Beach Club, washline under home. | 34° 31' 30.45" | 77° 20' 43.80" | wash line excellent (+/- 0.05) | NCGS monument, View Azimuth | 7.598 | 6.692 |

Locations and descriptions of high-water marks (HWM) and water- and ground-surface elevations for the Hurricane Bertha flood, Carteret County, North Carolina, July 13, 1996

[NAD 27, North American Datum 1927; NGVD, National Geodetic Vertical Datum 1929; NCGS, North Carolina Geodetical Survey; COE, Corps of Engineers; GIP, galvanized iron pipe; N/A, not applicable; AIWW, Atlantic Intracoastal Waterway; TBM, temporary benchmark]

| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground- surface elevation (NGVD, feet) |
|-------|--------------------------------|--|----------------------|-----------------------|--------------------------------------|----------------------------|-------------------------------------|--|
| CAR-1 | Salter Path | 911 Ocean Drive, Emerald Isle, N.C. Seedline under home in parking area. | 34° 40' 49.2" | 76° 55' 39.8" | seed line good (+/- 0.10) | NCGS monument CAR-74 | 9.395 | not measured |
| CAR-2 | Salter Path | In front of 911 Ocean Drive, west side of street. Debris line. | 34° 40' 49.2" | 76° 55' 39.8" | debris line poor (> 0.25) | NCGS monument CAR-74 | 10.015 | N/A |
| CAR-3 | Salter Path | In front of 911 Ocean Drive, west side of street. Debris line. | 34° 40' 49.2" | 76° 55' 39.8" | debris line poor (> 0.25) | NCGS monument CAR-74 | 10.045 | N/A |

Locations and descriptions of high-water marks (HWM'S) and water- and ground-surface elevations for the Hurricane Bertha flood, Beaufort County, North Carolina, July 13, 1996

[NAD 27, North American Datum 1927; NGVD, National Geodetic Vertical Datum 1929; NCGS, North Carolina Geodetical Survey; COE, Corps of Engineers; GIP, galvanized iron pipe; N/A, not applicable; AIWW, Atlantic Intracoastal Waterway; TBM, temporary benchmark]

| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|-------|--------------------------|--|-------------------|--------------------|--------------------------------|--------------------------|----------------------------|---------------------------------------|
| LW-1 | Washington | PJ's Grill, east end of town, on AC unit. | 35° 32' 5.02" | 77° 02' 27.00" | seed line good (+/- 0.10) | NCGS monument, BEA 15 | 6.313 | not measured |
| LW-2 | Washington | PJ's Grill, east of town in trailer beside AC unit. | 35° 32' 12.30" | 77° 02' 26.00" | seed line good (+/- 0.10) | NCGS monument, BEA 15 | 7.03 | not measured |
| LW-3 | Washington | On white house east of town, River Rd. (101). | 35° 32' 0.6" | 77° 02' 18.00" | seed line good (+/- 0.10) | NCGS monument, BEA 15 | 7.200 | not measured |
| LW-4G | Washington | Intown Carter Archie and Hassell. | 35° 32' 35.0" | 77° 03' 23.0" | seed line good (+/- 0.10) | TBM 1 | 7.030 | not measured |
| LW-5G | Washington | Respress ST nail DS side of street (orange paint) 60' off Main St. | 35° 32' 35.0" | 77° 03' 21.0" | seed line good (+/- 0.10) | TBM 1 | 7.100 | not measured |
| LW-6 | Washington | Washington Harbour 3rd St. 1st house left of St. (nail in post west end of house). | 35° 32' 48.0" | 77° 04' 00.00" | seed line good (+/- 0.10) | USGS PK 149 | 6.700 | not measured |
| LW-8 | Washington | Washington Harbour 3rd St. house 206 (in back). | 35° 32' 46.8" | 77° 03' 59.00" | seed line good (+/- 0.10) | USGS PK 149 | 6.280 | not measured |

Locations and descriptions of high-water marks (HWM'S) and water- and ground-surface elevations for the Hurricane Bertha flood, Beaufort County, North Carolina, July 13, 1996

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| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|--------|--------------------------|--|-------------------|--------------------|--------------------------------|-----------------------------|----------------------------|---------------------------------------|
| LW-9 | Washington | Short Dr./Washington St. 2.9' above concrete, left corner of basement door. | 35° 32' 42.5" | 77° 03' 49.8" | seed line good (+/- 0.10) | USGS PK 149 | 6.25 | not measured |
| LW-10G | Washington | Main St./Hwy. 117, house #501, 2.9' above basement floor. | 35° 32' 40.0" | 77° 03' 41.3" | seed line good (+/- 0.10) | USGS PK 149 | 7.260 | not measured |
| LW-11G | Washington | Main St next to Riverside Seafood, Carolina Wind Yachting Club, 1.5' below top of wall at DSS of wall 2nd step down. | 35° 32' 38.0" | 77° 03' 36.0" | seed line good (+/- 0.10) | TBM 1 | 6.920 | not measured |
| LW-12F | Washington | W. Main St./Gladden St. (seed line). | 35° 32' 36.0" | 77° 03' 31.5" | seed line fair (+/- 0.25) | TBM 1 | 7.160 | not measured |
| LW-13G | Washington | USGS Marker in walkway of end (east) park in town. | 35° 32' 23.00" | 77° 03' 14.99" | seed line good (+/- 0.10) | TBM 1 | 6.850 | not measured |
| LW-14G | Washington | .72' above concrete in back of Historic Alb. Tour (nail in door facing (on Water St). | 35° 32' 27.5" | 77° 03' 21.9" | seed line good (+/- 0.10) | TBM 1 | 6.340 | not measured |
| LW-15G | Washington | 1.51' above concrete pad on transformer box in back of building of LW14G on Water St. | 35° 32' 28.0" | 77° 03' 20.0" | seed line good (+/- 0.10) | TBM 1 | 7.040 | not measured |
| LW-20G | Washington | Nail in Washington Post light pole at end of Pine St. | 35° 31' 54.00" | 77° 02' 09.10" | seed line good (+/- 0.10) | NCGS monument, BEA 15 | 6.20 | not measured |

Locations and descriptions of high-water marks (HWM'S) and water- and ground-surface elevations for the Hurricane Bertha flood, Beaufort County, North Carolina, July 13, 1996

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| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground- surface elevation (NGVD, feet) |
|---------|--------------------------------|--|----------------------|-----------------------|--------------------------------------|--------------------------------|-------------------------------------|--|
| LW-21G | Washington | Hwy. 17 at south end of bridge, left side of overhead door fourth from end, 1.81 cu. ft. concrete. | 35° 32' 27.00" | 77° 03' 15.00" | seed line good +/- 0.10 | NCGS monument, DRAW | 7.09 | not measured |
| LW-22G | Washington | Park Boat Co. Hwy. 17 S. Nail in wall inside fence near shop for boats. | 35° 32' 13.00" | 77° 04' 01.00" | seed line good +/- 0.10 | USGS PK 159 | 6.48 | not measured |
| LW-23G | Washington | Floyd's Auto, Hwy. 17 S. South corner of shop in back, painted orange. | 35° 32' 8.5" | 77° 04' 06.00" | seed line good +/- 0.10 | USGS PK 159 | 6.49 | not measured |
| LW-24G | Washington | Ginn's Seafood, Hwy. 17 S. | 35° 32' 11.00" | 77° 04' 02.50" | seed line good +/- 0.10 | USGS PK 159 | 6.55 | not measured |
| LW-26 | Washington | On Hwy. 17 east on Whichard Beach Road, first house on right (seed line on glass window). | 35° 32' 7.5" | 77° 04' 24.90" | seed line good +/- 0.10 | NCGS monument BEA 46 | 7.12 | not measured |
| LW-26.1 | Washington | House on corner of Hwy. 17 south and Whichard Beach Rd. (seed line on window). | 35° 32' 9.0" | 77° 04' 23.00" | seed line good +/- 0.10 | NCGS monument BEA 46 | 7.21 | not measured |
| LW-32E | Washington | Whichard-Marina, at door to stove (nail). | 35° 30' 16.00" | 77° 01' 25.00" | seed line excellent +/- 0.05 | NCGS monument BEACH 1965 | 7.13 | not measured |

Locations and descriptions of high-water marks (HWM'S) and water- and ground-surface elevations for the Hurricane Bertha flood, Beaufort County, North Carolina, July 13, 1996

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| HWM | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM (feet) | Benchmark used | HWM elevation (NGVD, feet) | Ground-surface elevation (NGVD, feet) |
|---------|--------------------------|---|-------------------|--------------------|--------------------------------|---------------------------|----------------------------|---------------------------------------|
| LW-33G | Washington | On AC unit under dance hall at Whichard Beach. | 35° 30' 17.00" | 77° 01' 24.99" | good (+/- 0.10) | NCGS monument, BEACH 1965 | 6.68 | not measured |
| LW33.1G | Washington | Debris line on fence surrounding water slide at Whichard Beach. | 35° 30' 20.1" | 77° 01' 30.13" | debris line fair (+/- 0.25) | NCGS monument, BEACH 1965 | 7.09 | not measured |
| LW-34E | Washington | Same as above in concrete suport at front. | 35° 30' 18.00" | 77° 01' 24.30" | seed line excellent (+/- 0.05) | NCGS monument, BEACH 1965 | 7.28 | not measured |

Locations and descriptions of high-water marks (HWM'S) and water- and ground-surface elevations for the Hurricane Bertha flood, Beaufort County, North Carolina, July 13, 1996

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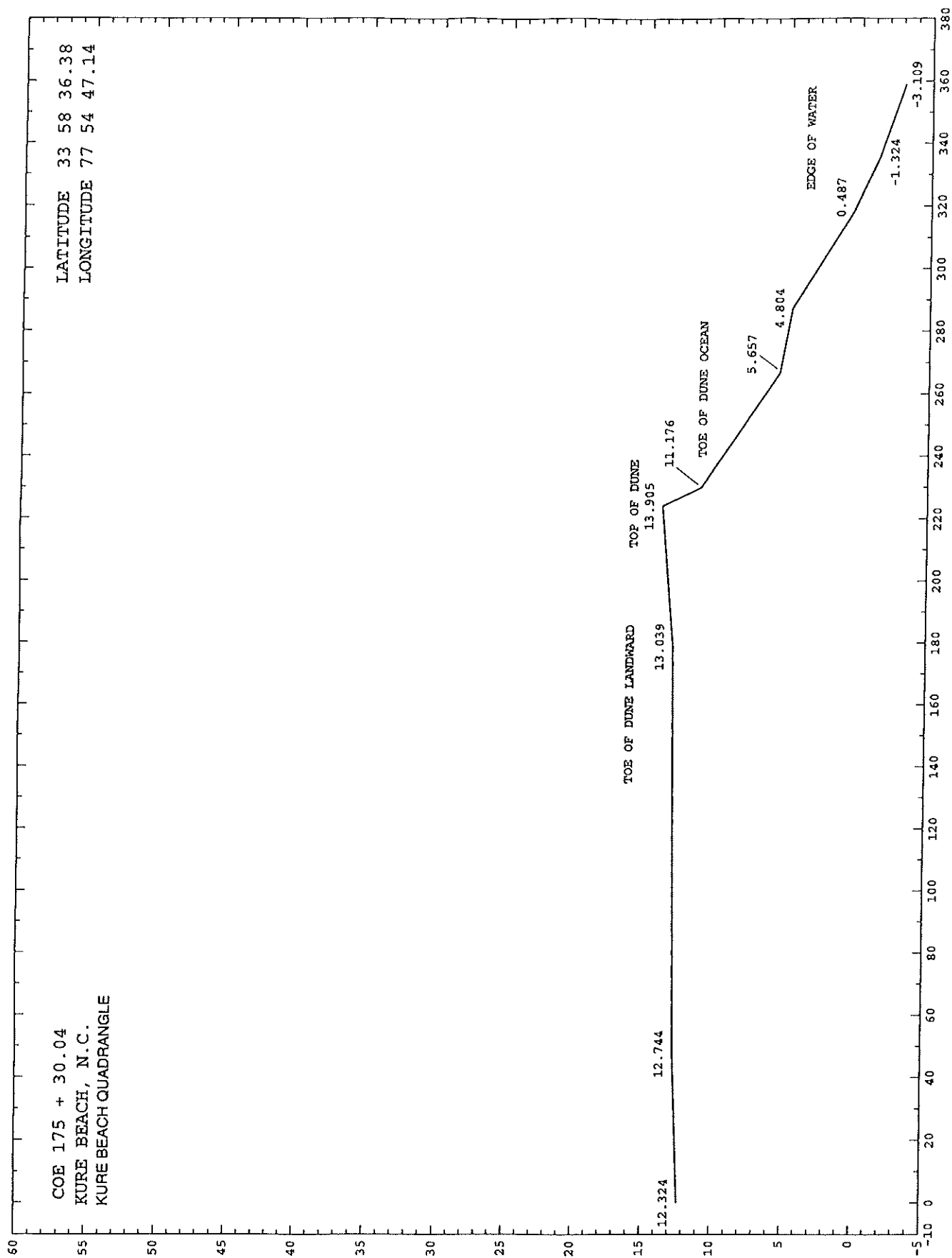
| HWM id | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM | Benchmark used | Water-surface elevation (NGVD 29 feet) | Ground-surface elevation (NGVD 29 feet) |
|--------|--------------------------|---|-------------------|--------------------|--|-------------------------|--|---|
| BH1 | Bellhaven | Between Chamb. of Commerce Bldg. (red) and Tin Bldg. (Cold Smith & Douglas) Fert. Bldg. - mark is approx. 15' up ramp, 1ft from left side | 35° 32' 23.3" | 76° 37' 27.0" | debris line excellent +/- 0.05 | NCGS monument BEA 10 | 5.381 | not measured |
| BH1.1 | Bellhaven | At the end of Haslin Street along Pantego Creek. Debris line on tin building | 35° 32' 19.5" | 76° 37' 28.5" | debris line good +/- 0.10 | NCGS monument BEA 10 | 5.520 | not measured |
| BH2 | Bellhaven | In side of O'Neals Drug Store (several flagged by owner manager) corner of Pamlico St. & Main St. | 35° 32' 16.0" | 76° 37' 17.5" | sea mud line excellent +/- 0.05 | NCGS monument BEA 10 | 5.261 | not measured |
| BH3 | Bellhaven | Belhaven Shipyard and Marina - pencil mark on left side of Bldg at door | 35° 32' 07.5" | 76° 36' 51.0" | water mark inside bldg good +/- 0.10 | NCGS monument BEA 10 | 5.626 | not measured |
| BH5 | Pantego | In work area of Phillips 66 Station, pencil mark on tool bin about 1/2 way thru station on west wall(route 264) | 35° 32' 31.0" | 76° 37' 31.5" | seed line good +/- 0.10 | NCGS monument U 164 | 5.718 | not measured |
| BH6 | Pantego | at center upright post of right gate to drive leading to Belhaven (Feedmill not in use) | 35° 32' 49.5" | 76° 37' 58.0" | debris line good +/- 0.10 | NCGS monument U 164 | 5.613 | not measured |

Locations and descriptions of high-water marks (HWM'S) and water- and ground-surface elevations for the Hurricane Bertha flood, Beaufort County, North Carolina, July 13, 1996

[NAD 27, North American Datum 1927; NGVD, National Geodetic Vertical Datum 1929; NCGS, North Carolina Geodetical Survey; COE, Corps of Engineers; GIP, galvanized iron pipe; N/A, not applicable; AIWW, Atlantic Intracoastal Waterway; TBM, temporary benchmark]

| HWM id | USGS quadrangle map name | HWM description | Latitude (NAD 27) | Longitude (NAD 27) | Type and quality of HWM | Benchmark used | Water-surface elevation (NGVD 29 feet) | Ground-surface elevation (NGVD 29 feet) |
|--------|--------------------------|---|-------------------|--------------------|---------------------------------------|---------------------|--|---|
| BH6.1 | Pantego | On Route 99 east side of bridge over Pantego Creek. Debris line on fence | 35° 32' 48.0" | 76° 37' 58.5" | debris line fair +/- 0.25 | NCGS monument U 164 | 5.498 | not measured |
| BH8 | Pantego | Debris line south of bridge at Pantego Creek. East side of road | 35° 32' 17.5" | 76° 38' 19.5" | wash line fair +/- 0.25 | NCGS monument V 164 | 4.827 | not measured |
| BH9 | Pantego | Inside of Marina office and store at Cee Bee Marina - several marks inside of bldg. on door frame | 35° 30' 08.8" | 76° 40' 22.0" | water stain & mud lines good +/- 0.10 | NCGS monument A 165 | 5.701 | not measured |
| BH9.1 | Pantego | Wash line on front of home, north of Pantego Creek east side of Route 99 | 35° 30' 05.5" | 76° 40' 22.0" | wash line good +/- 0.10 | NCGS monument A 165 | 5.731 | not measured |

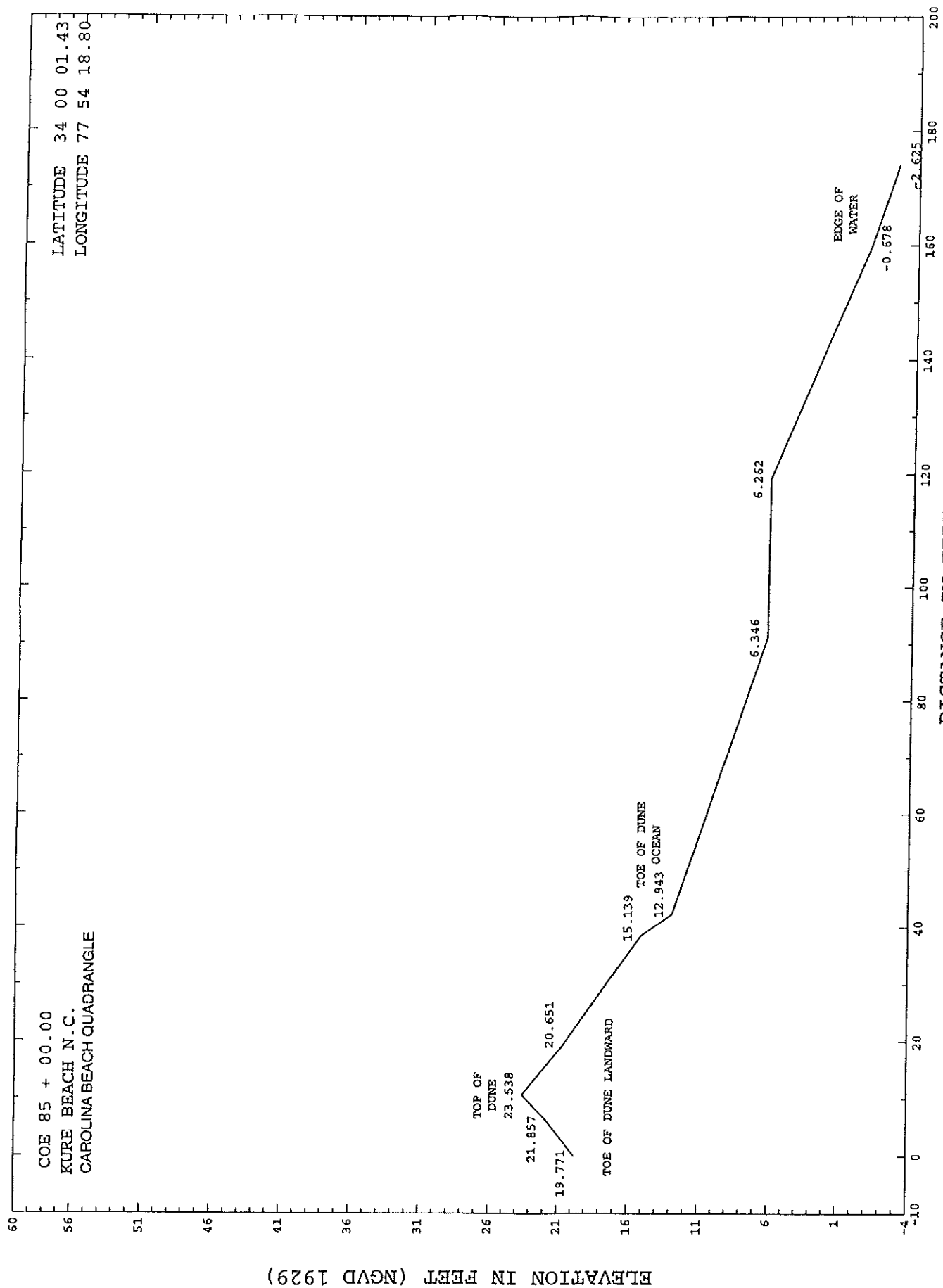
**NEW HANOVER COUNTY
BEACH PROFILES**



NEW HANOVER COUNTY, NORTH CAROLINA
BEACH PROFILE 1

Beach profile data, Hurricane Bertha, July 1996.

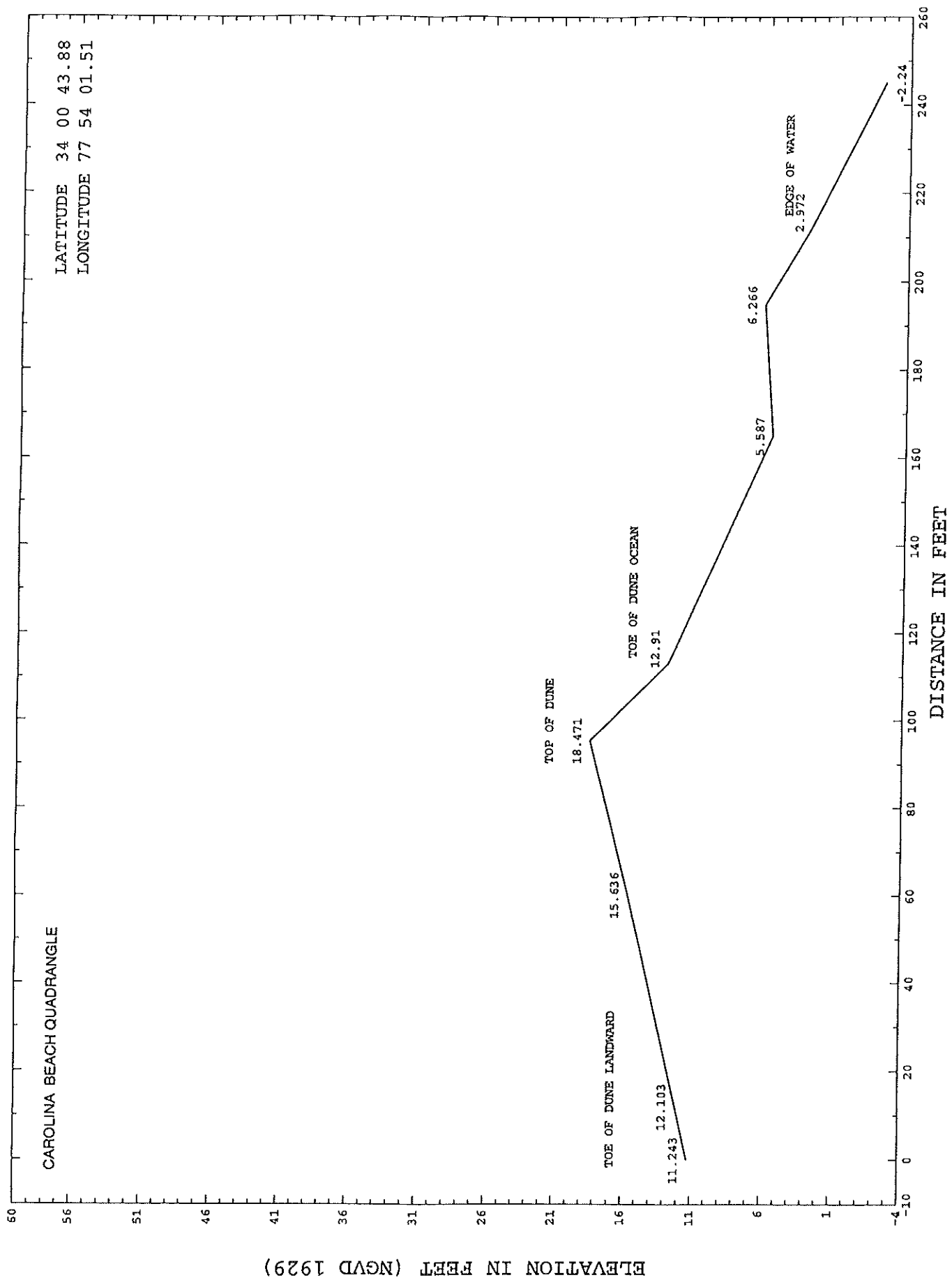
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 1 | 0 | 12.324 |
| New Hanover | 1 | 47.64 | 12.744 |
| New Hanover | 1 | 178.96 | 13.039 |
| New Hanover | 1 | 224.16 | 13.905 |
| New Hanover | 1 | 230.07 | 11.176 |
| New Hanover | 1 | 266.88 | 5.657 |
| New Hanover | 1 | 287.57 | 4.804 |
| New Hanover | 1 | 318.23 | 0.487 |
| New Hanover | 1 | 335.72 | -1.324 |
| New Hanover | 1 | 358.88 | -3.109 |



NEW HANOVER COUNTY, NORTH CAROLINA
BEACH PROFILE 2

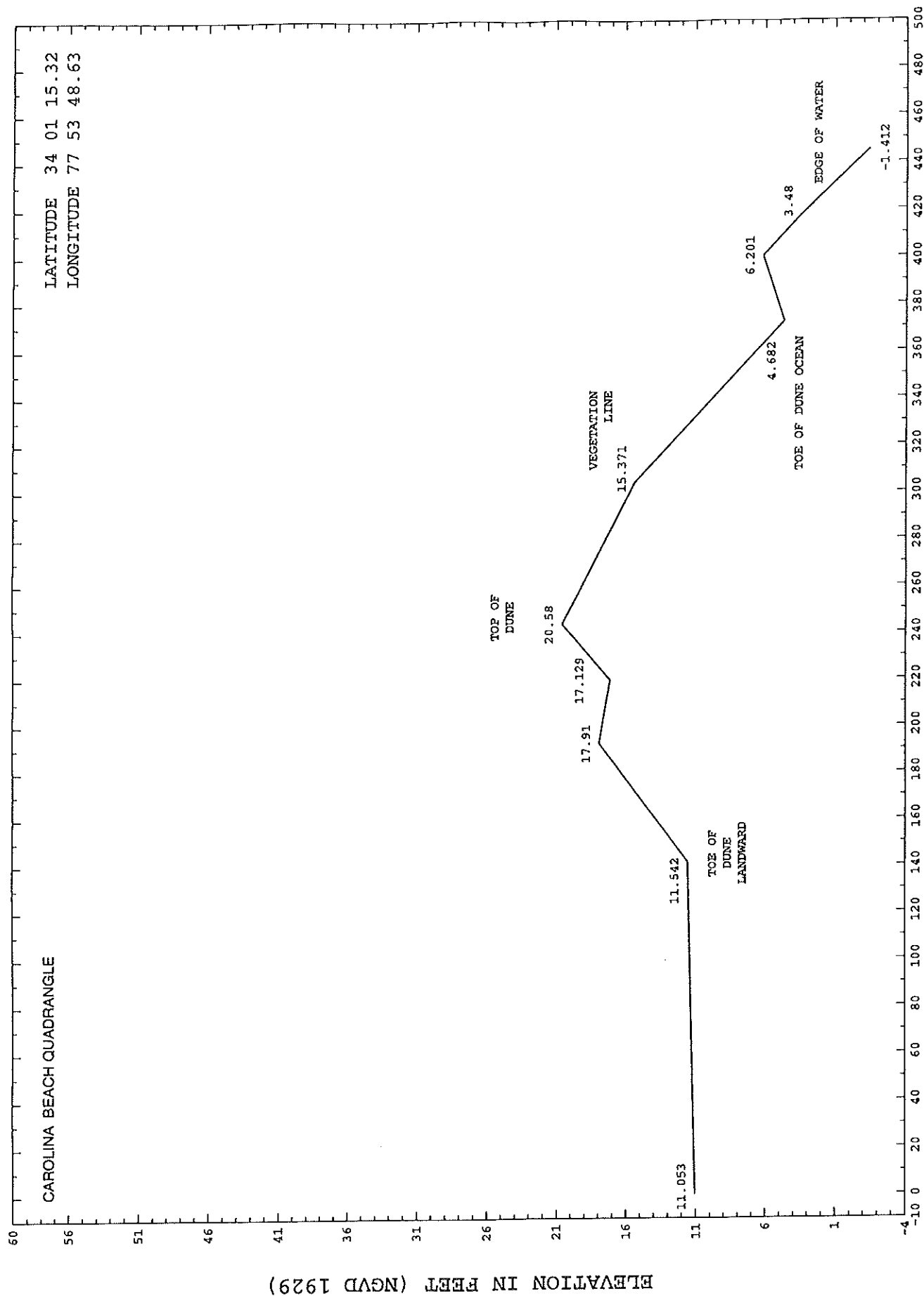
Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 2 | 0 | 19.771 |
| New Hanover | 2 | 6.41 | 21.857 |
| New Hanover | 2 | 10.63 | 23.538 |
| New Hanover | 2 | 19.27 | 20.651 |
| New Hanover | 2 | 38.62 | 15.139 |
| New Hanover | 2 | 42.37 | 12.943 |
| New Hanover | 2 | 91.26 | 6.346 |
| New Hanover | 2 | 119.26 | 6.262 |
| New Hanover | 2 | 159.62 | -.678 |
| New Hanover | 2 | 174.11 | -2.625 |



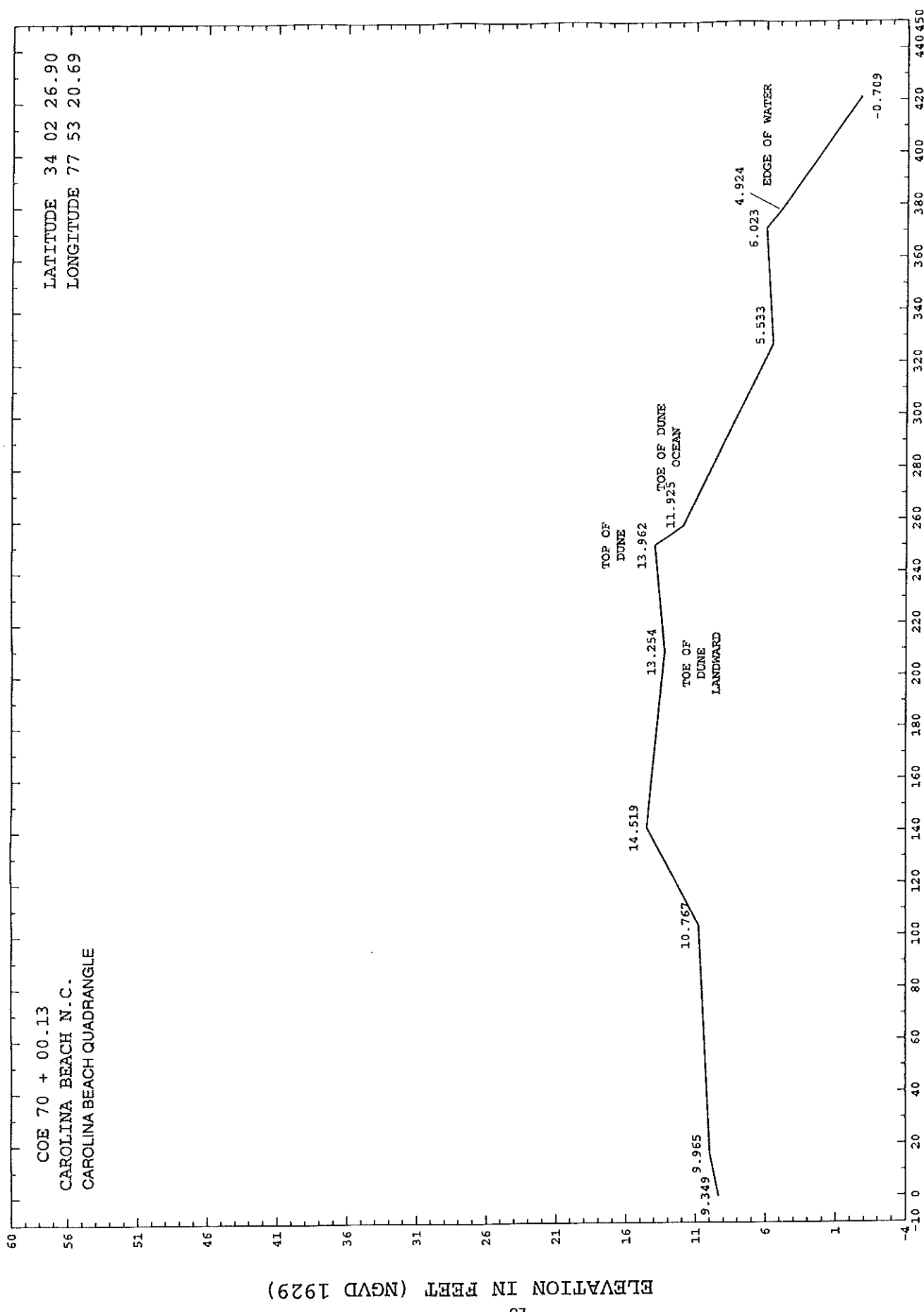
Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 3 | 0 | 11.243 |
| New Hanover | 3 | 12 | 12.103 |
| New Hanover | 3 | 60.26 | 15.636 |
| New Hanover | 3 | 95.53 | 18.471 |
| New Hanover | 3 | 113.15 | 12.910 |
| New Hanover | 3 | 165.09 | 5.587 |
| New Hanover | 3 | 194.77 | 6.266 |
| New Hanover | 3 | 212.32 | 2.972 |
| New Hanover | 3 | 245.01 | -2.24 |



Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 4 | 0 | 11.053 |
| New Hanover | 4 | 141.31 | 11.542 |
| New Hanover | 4 | 192.59 | 17.910 |
| New Hanover | 4 | 219.85 | 17.129 |
| New Hanover | 4 | 243.85 | 20.580 |
| New Hanover | 4 | 304.11 | 15.371 |
| New Hanover | 4 | 372.29 | 4.682 |
| New Hanover | 4 | 400.16 | 6.201 |
| New Hanover | 4 | 417.38 | 3.48 |
| New Hanover | 4 | 445.07 | -1.412 |

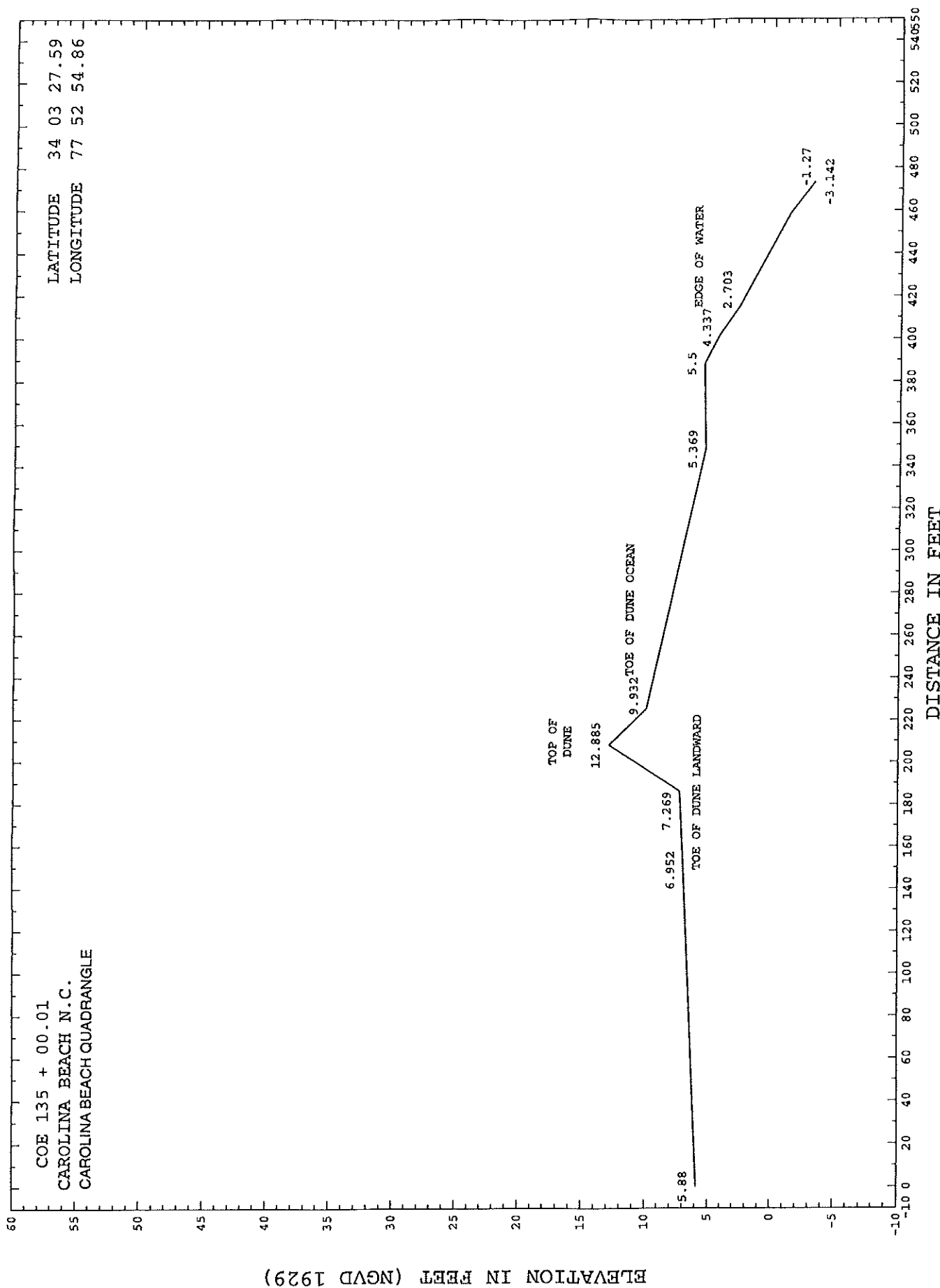


DISTANCE IN FEET
 NEW HANOVER COUNTY, NORTH CAROLINA
 BEACH PROFILE 5

COE 70 + 00.13
 CAROLINA BEACH N.C.
 CAROLINA BEACH QUADRANGLE

Beach profile data, Hurricane Bertha, July 1996.

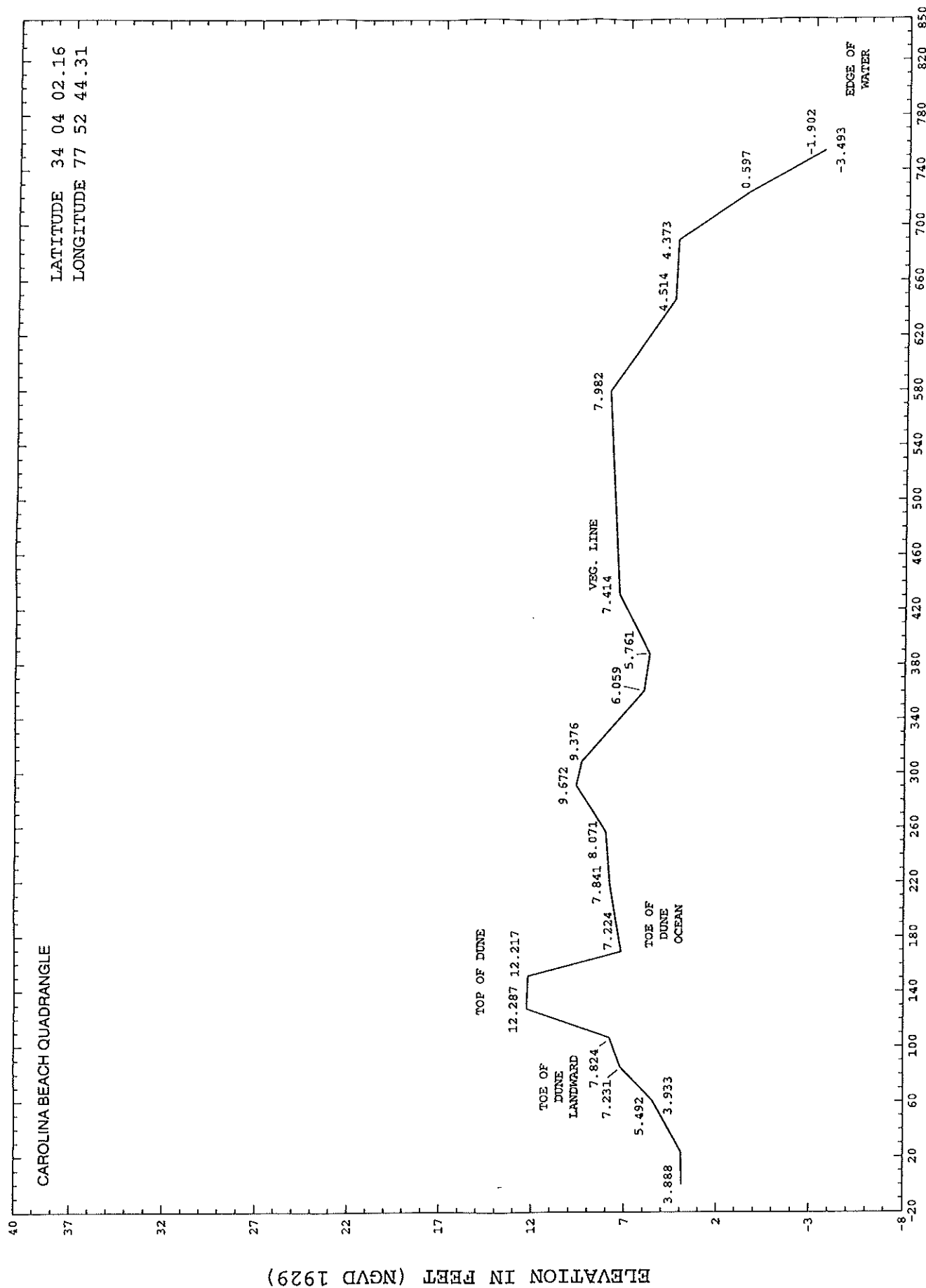
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 5 | 0 | 9.349 |
| New Hanover | 5 | 16.11 | 9.965 |
| New Hanover | 5 | 103.83 | 10.767 |
| New Hanover | 5 | 141.42 | 14.519 |
| New Hanover | 5 | 209.35 | 13.254 |
| New Hanover | 5 | 250.47 | 13.962 |
| New Hanover | 5 | 257.81 | 11.925 |
| New Hanover | 5 | 327.06 | 5.533 |
| New Hanover | 5 | 371.21 | 6.023 |
| New Hanover | 5 | 378.35 | 4.924 |
| New Hanover | 5 | 421.18 | -0.709 |



DISTANCE IN FEET
NEW HANOVER COUNTY, NORTH CAROLINA
BEACH PROFILE 6

Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 6 | 0 | 5.88 |
| New Hanover | 6 | 148.95 | 6.952 |
| New Hanover | 6 | 186.35 | 7.269 |
| New Hanover | 6 | 208.20 | 12.885 |
| New Hanover | 6 | 225.55 | 9.932 |
| New Hanover | 6 | 348.33 | 5.369 |
| New Hanover | 6 | 388.56 | 5.500 |
| New Hanover | 6 | 401.52 | 4.337 |
| New Hanover | 6 | 415.42 | 2.703 |
| New Hanover | 6 | 458.82 | -1.270 |
| New Hanover | 6 | 473.28 | -3.142 |



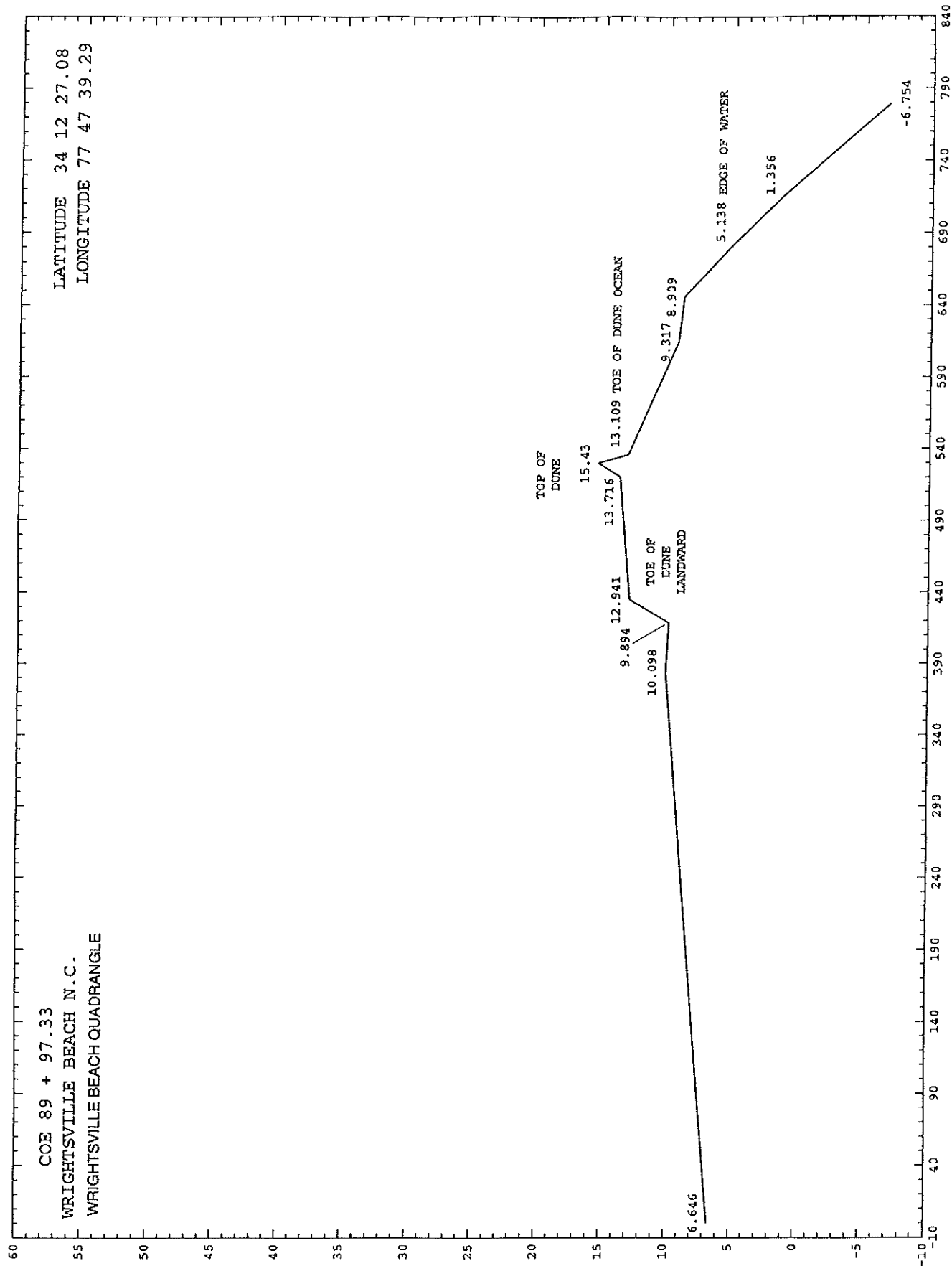
NEW HANOVER COUNTY, NORTH CAROLINA
BEACH PROFILE 7

Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 7 | 0 | 3.888 |
| New Hanover | 7 | 23.43 | 3.933 |
| New Hanover | 7 | 61.03 | 5.492 |
| New Hanover | 7 | 85.11 | 7.231 |
| New Hanover | 7 | 106.70 | 7.824 |
| New Hanover | 7 | 127.70 | 12.287 |
| New Hanover | 7 | 151.54 | 12.217 |
| New Hanover | 7 | 169.33 | 7.224 |
| New Hanover | 7 | 218.66 | 7.841 |
| New Hanover | 7 | 256.98 | 8.071 |
| New Hanover | 7 | 291.51 | 9.672 |
| New Hanover | 7 | 309.35 | 9.376 |
| New Hanover | 7 | 361.06 | 6.059 |
| New Hanover | 7 | 388.01 | 5.761 |
| New Hanover | 7 | 431.63 | 7.414 |
| New Hanover | 7 | 580.05 | 7.982 |
| New Hanover | 7 | 646.60 | 4.514 |
| New Hanover | 7 | 689.69 | 4.373 |
| New Hanover | 7 | 723.33 | 0.597 |
| New Hanover | 7 | 742.03 | -1.902 |
| New Hanover | 7 | 754.08 | -3.493 |

Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 8 | 0 | 6.487 |
| New Hanover | 8 | 103.36 | 7.843 |
| New Hanover | 8 | 156.86 | 10.951 |
| New Hanover | 8 | 211.37 | 13.938 |
| New Hanover | 8 | 224.74 | 14.483 |
| New Hanover | 8 | 262.79 | 12.129 |
| New Hanover | 8 | 272.93 | 14.010 |
| New Hanover | 8 | 293.71 | 10.943 |
| New Hanover | 8 | 360.10 | 9.575 |
| New Hanover | 8 | 367.77 | 8.353 |
| New Hanover | 8 | 383.09 | 11.835 |
| New Hanover | 8 | 411.67 | 9.078 |
| New Hanover | 8 | 456.06 | 11.183 |
| New Hanover | 8 | 494.98 | 7.633 |
| New Hanover | 8 | 534.22 | 7.874 |
| New Hanover | 8 | 552.64 | 9.392 |
| New Hanover | 8 | 554.64 | 8.314 |
| New Hanover | 8 | 561.15 | 7.764 |
| New Hanover | 8 | 606.10 | 6.697 |
| New Hanover | 8 | 678.75 | 4.684 |
| New Hanover | 8 | 738.02 | 1.192 |
| New Hanover | 8 | 788.89 | -0.741 |
| New Hanover | 8 | 826.05 | -2.025 |
| New Hanover | 8 | 849.49 | -3.151 |

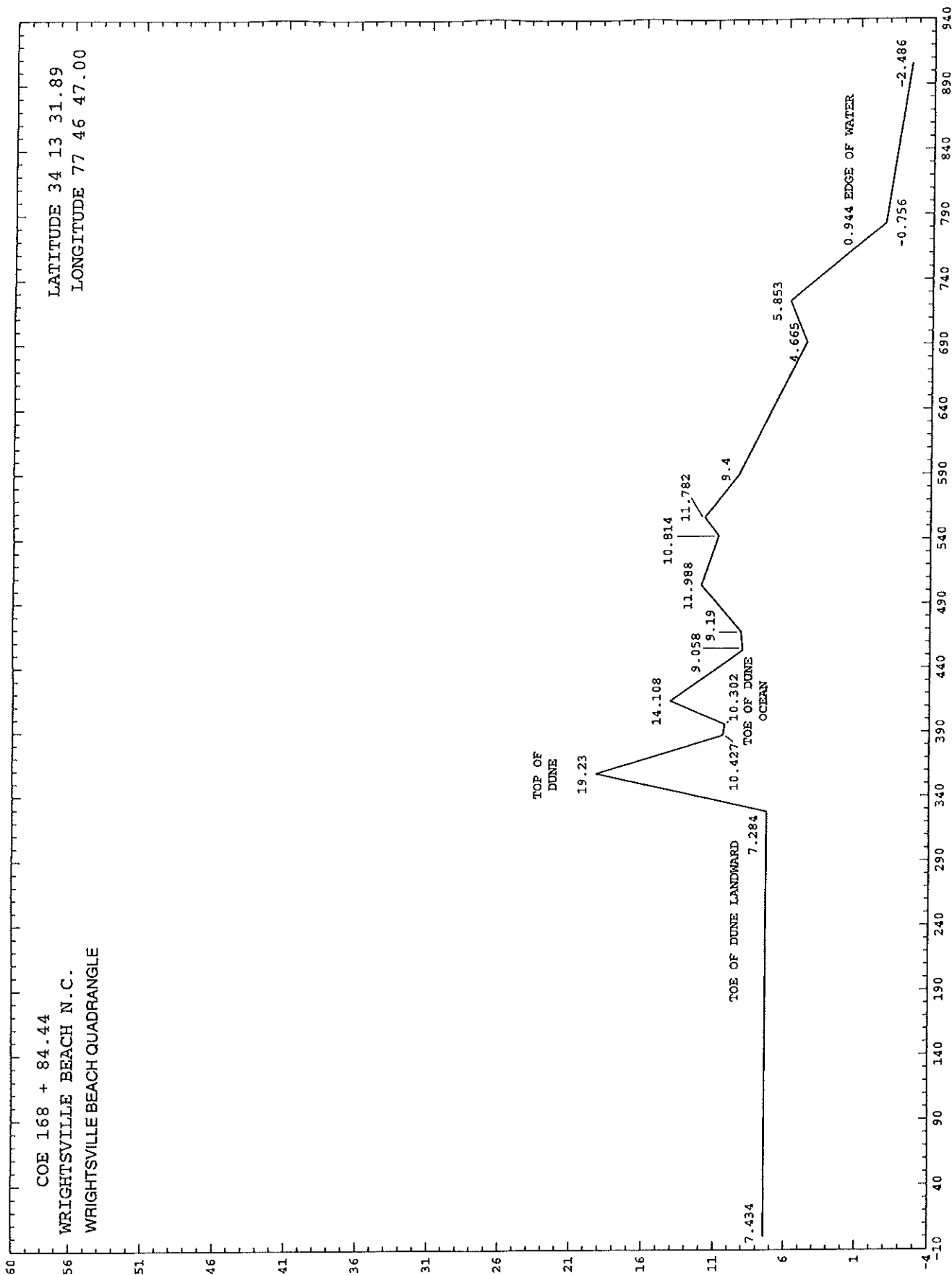


NEW HANOVER COUNTY, NORTH CAROLINA
BEACH PROFILE 9

Beach profile data, Hurricane Bertha, July 1996.

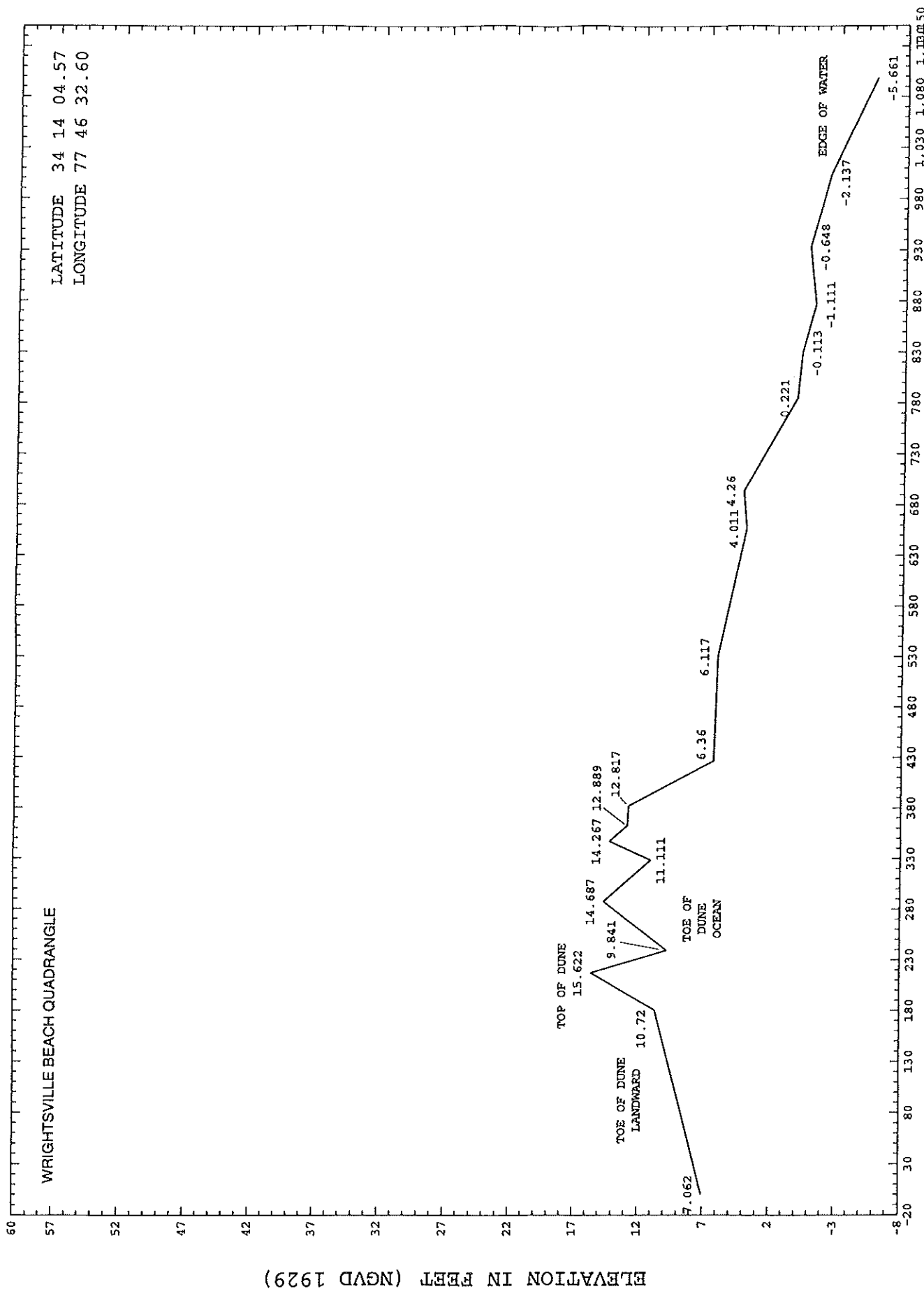
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 9 | 0 | 6.646 |
| New Hanover | 9 | 384.44 | 10.098 |
| New Hanover | 9 | 419.11 | 9.894 |
| New Hanover | 9 | 435.48 | 12.941 |
| New Hanover | 9 | 520.85 | 13.716 |
| New Hanover | 9 | 530.35 | 15.430 |
| New Hanover | 9 | 536.16 | 13.109 |
| New Hanover | 9 | 614.72 | 9.317 |
| New Hanover | 9 | 646.02 | 8.909 |
| New Hanover | 9 | 682.08 | 5.138 |
| New Hanover | 9 | 715.32 | 1.356 |
| New Hanover | 9 | 779.25 | -6.754 |

ELEVATION IN FEET (NGVD 1929)



Beach profile data, Hurricane Bertha, July 1996.

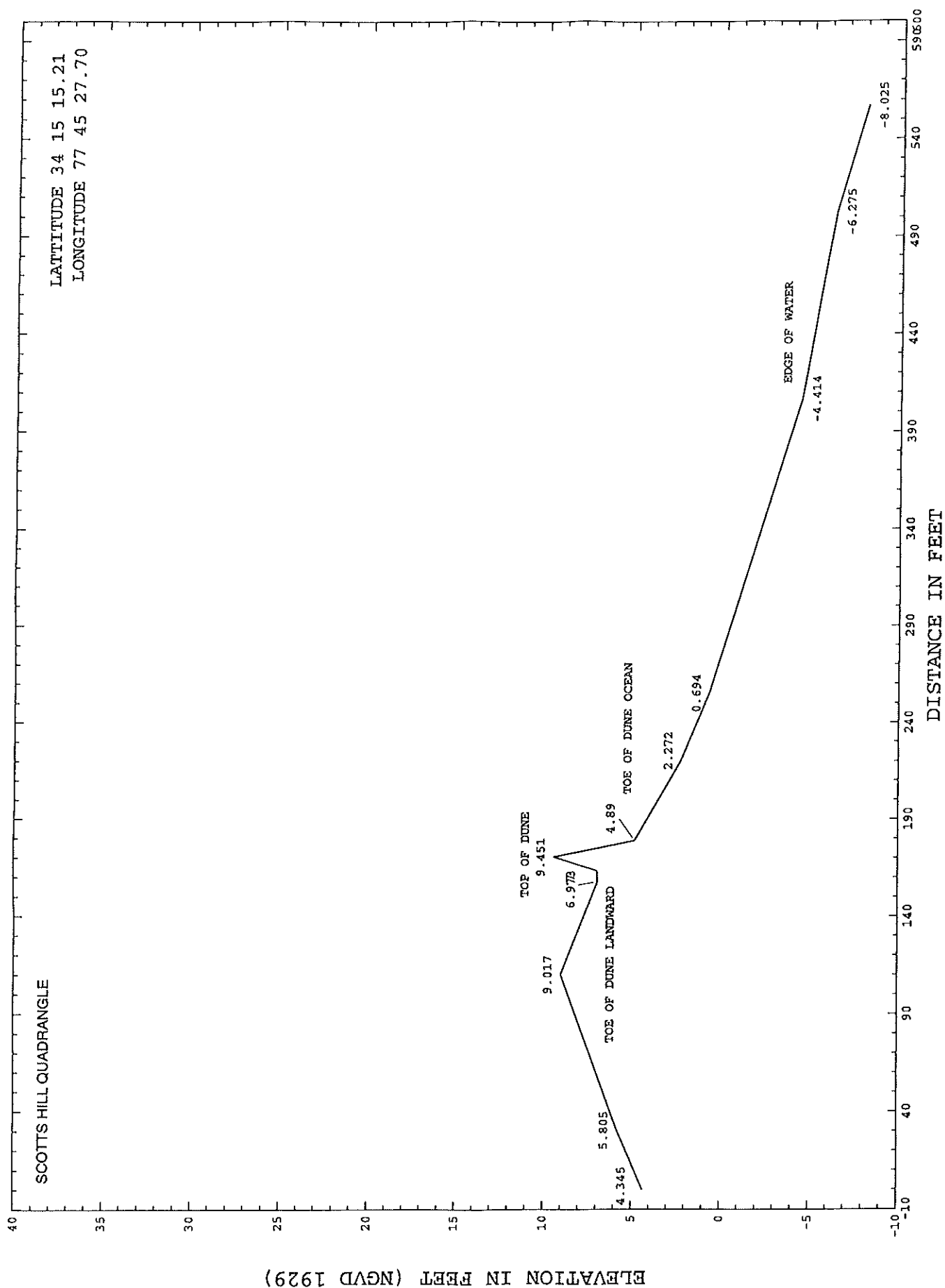
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 10 | 0 | 7.434 |
| New Hanover | 10 | 328.24 | 7.284 |
| New Hanover | 10 | 358.30 | 19.230 |
| New Hanover | 10 | 387.90 | 10.427 |
| New Hanover | 10 | 396.44 | 10.302 |
| New Hanover | 10 | 414.84 | 14.108 |
| New Hanover | 10 | 453.98 | 9.058 |
| New Hanover | 10 | 468.46 | 9.190 |
| New Hanover | 10 | 504.59 | 11.988 |
| New Hanover | 10 | 542.95 | 10.814 |
| New Hanover | 10 | 557.30 | 11.782 |
| New Hanover | 10 | 589.84 | 9.400 |
| New Hanover | 10 | 691.72 | 4.665 |
| New Hanover | 10 | 723.64 | 5.853 |
| New Hanover | 10 | 767.83 | 0.944 |
| New Hanover | 10 | 782.84 | -0.756 |
| New Hanover | 10 | 905.66 | -2.486 |



NEW HANOVER COUNTY, NORTH CAROLINA
BEACH PROFILE 11

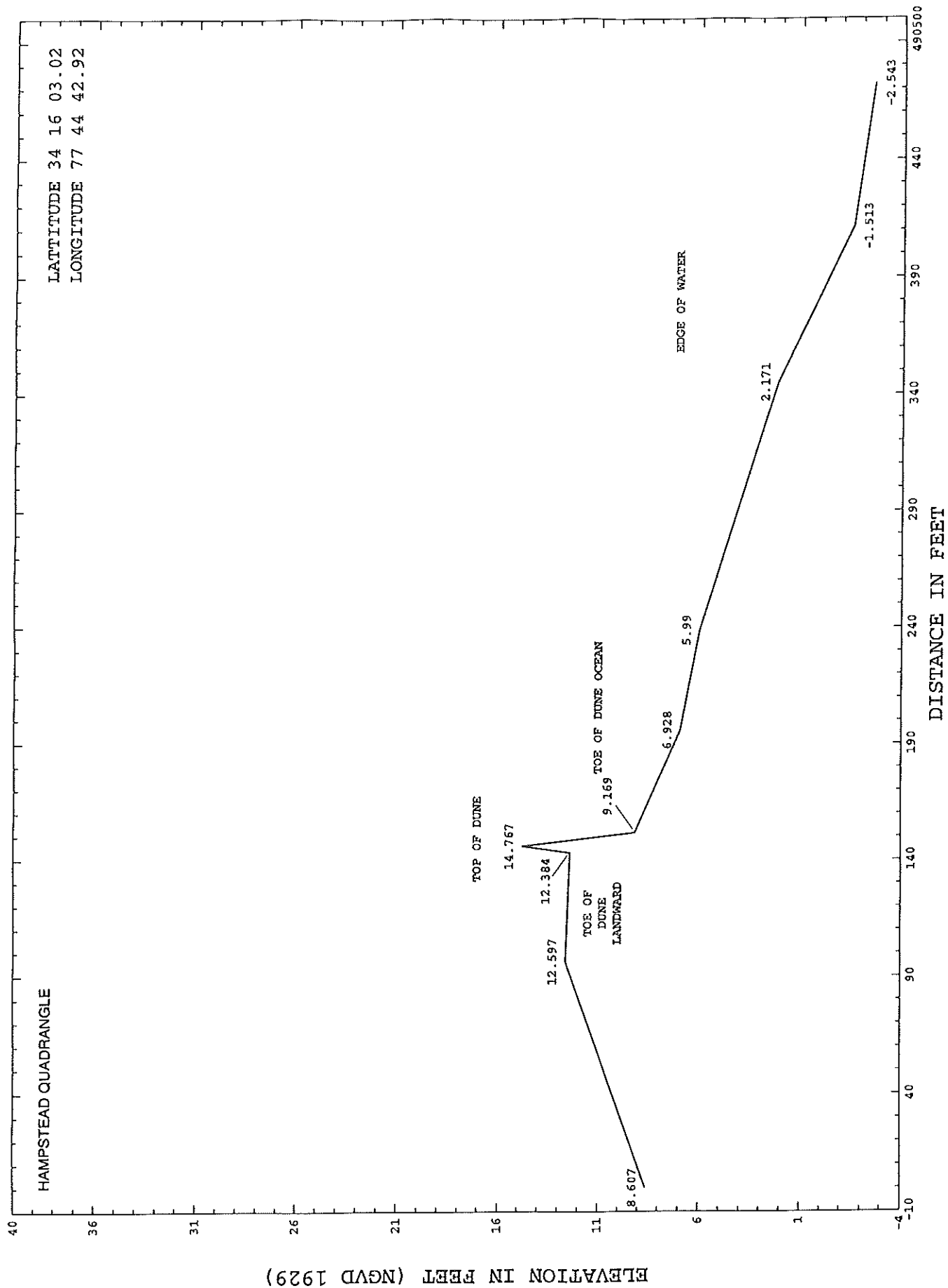
Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 11 | 0 | 7.062 |
| New Hanover | 11 | 180.69 | 10.720 |
| New Hanover | 11 | 217.62 | 15.622 |
| New Hanover | 11 | 239.60 | 9.841 |
| New Hanover | 11 | 288.02 | 14.687 |
| New Hanover | 11 | 328.87 | 11.111 |
| New Hanover | 11 | 347.57 | 14.267 |
| New Hanover | 11 | 363.19 | 12.889 |
| New Hanover | 11 | 382.57 | 12.817 |
| New Hanover | 11 | 426.97 | 6.360 |
| New Hanover | 11 | 530.16 | 6.117 |
| New Hanover | 11 | 657.12 | 4.011 |
| New Hanover | 11 | 694.16 | 4.260 |
| New Hanover | 11 | 785.28 | 0.221 |
| New Hanover | 11 | 829.60 | -0.113 |
| New Hanover | 11 | 877.11 | -1.111 |
| New Hanover | 11 | 933.32 | -0.648 |
| New Hanover | 11 | 1003.83 | -2.137 |
| New Hanover | 11 | 1098.61 | -5.661 |



Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 12 | 0 | 4.345 |
| New Hanover | 12 | 30.51 | 5.805 |
| New Hanover | 12 | 110.31 | 9.017 |
| New Hanover | 12 | 157.76 | 6.973 |
| New Hanover | 12 | 163.66 | 7.00 |
| New Hanover | 12 | 170.72 | 9.451 |
| New Hanover | 12 | 179.14 | 4.890 |
| New Hanover | 12 | 220.55 | 2.272 |
| New Hanover | 12 | 255.48 | 0.694 |
| New Hanover | 12 | 406.82 | -4.414 |
| New Hanover | 12 | 502.42 | -6.275 |
| New Hanover | 12 | 557.03 | -8.025 |

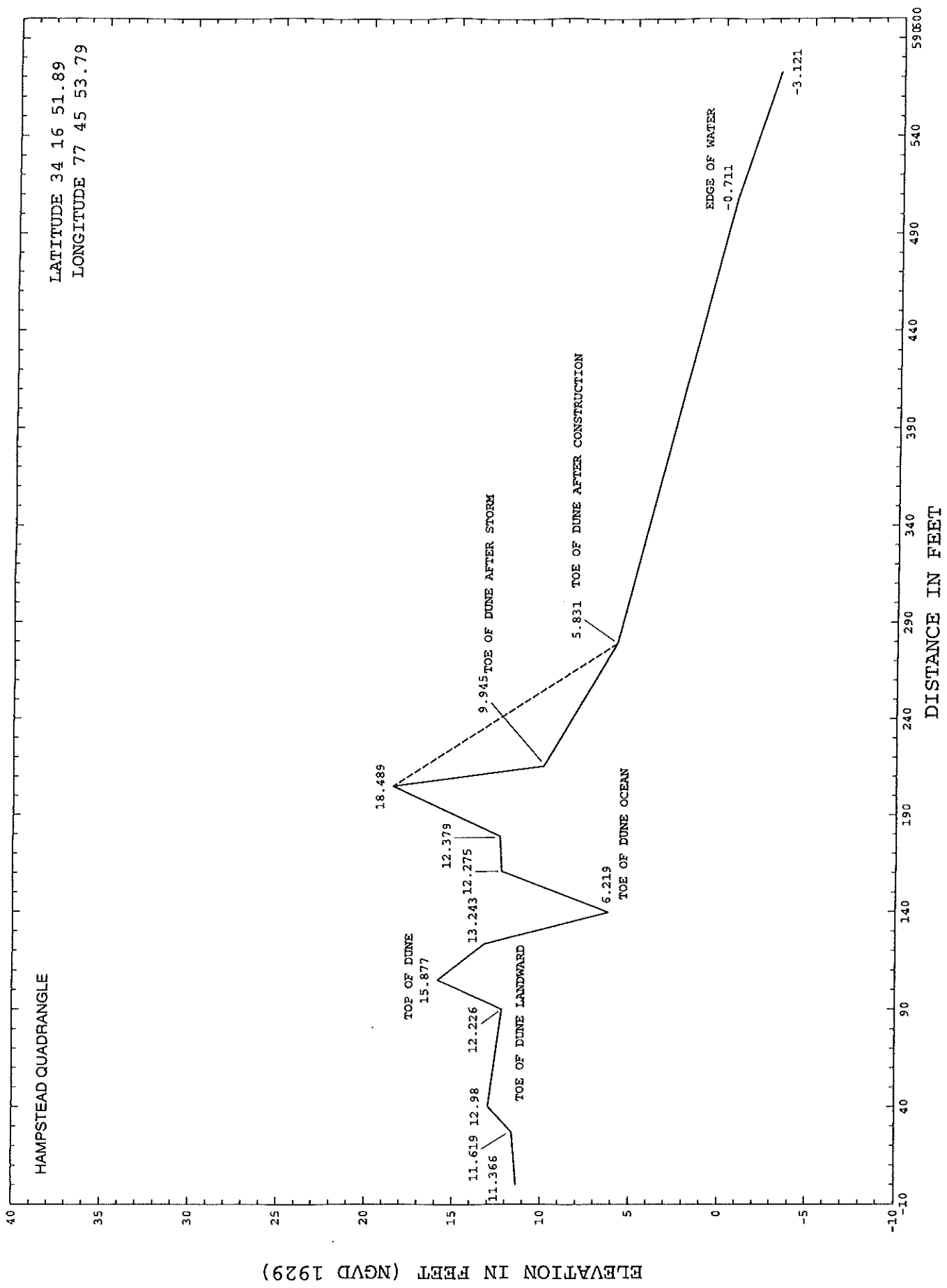


NEW HANOVER COUNTY, NORTH CAROLINA
BEACH PROFILE 13

Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 13 | 0 | 8.607 |
| New Hanover | 13 | 96.40 | 12.597 |
| New Hanover | 13 | 143.19 | 12.384 |
| New Hanover | 13 | 146.15 | 14.767 |
| New Hanover | 13 | 151.80 | 9.169 |
| New Hanover | 13 | 196.05 | 6.928 |
| New Hanover | 13 | 239.10 | 5.990 |
| New Hanover | 13 | 345.09 | 2.171 |
| New Hanover | 13 | 411.34 | -1.513 |
| New Hanover | 13 | 472.10 | -2.543 |

EXP

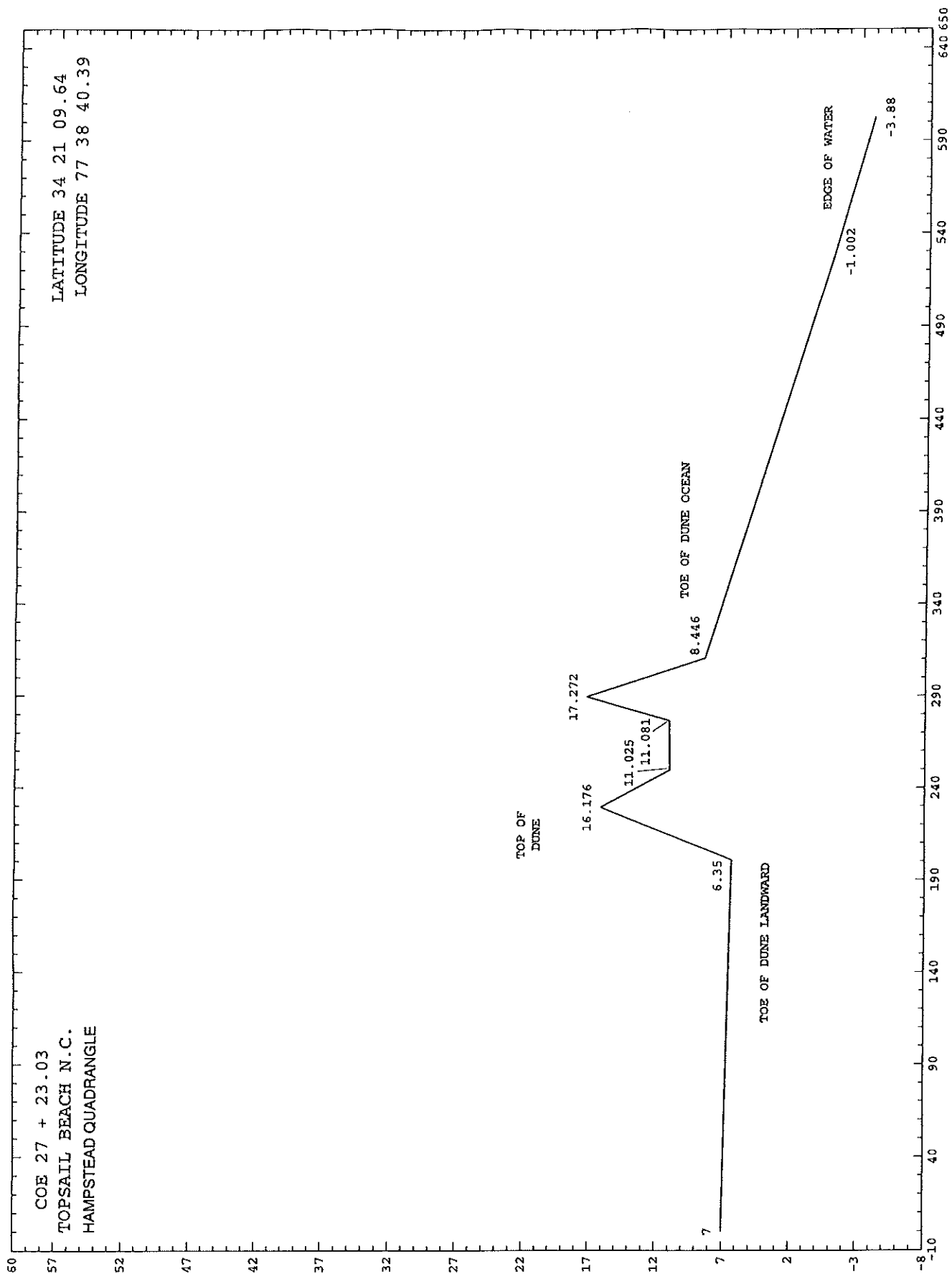


Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|-------------|-----------|----------|------------------------------|
| New Hanover | 14 | 0 | 11.366 |
| New Hanover | 14 | 26.96 | 11.619 |
| New Hanover | 14 | 40.18 | 12.980 |
| New Hanover | 14 | 90.17 | 12.226 |
| New Hanover | 14 | 105.04 | 15.877 |
| New Hanover | 14 | 123.65 | 13.243 |
| New Hanover | 14 | 139.91 | 6.219 |
| New Hanover | 14 | 161.06 | 12.275 |
| New Hanover | 14 | 179.19 | 12.379 |
| New Hanover | 14 | 205.12 | 18.489 |
| New Hanover | 14 | 215.63 | 9.945 |
| New Hanover | 14 | 279.32 | 5.831 |
| New Hanover | 14 | 508.18 | -0.711 |
| New Hanover | 14 | 572.82 | -3.121 |

**PENDER COUNTY
BEACH PROFILES**

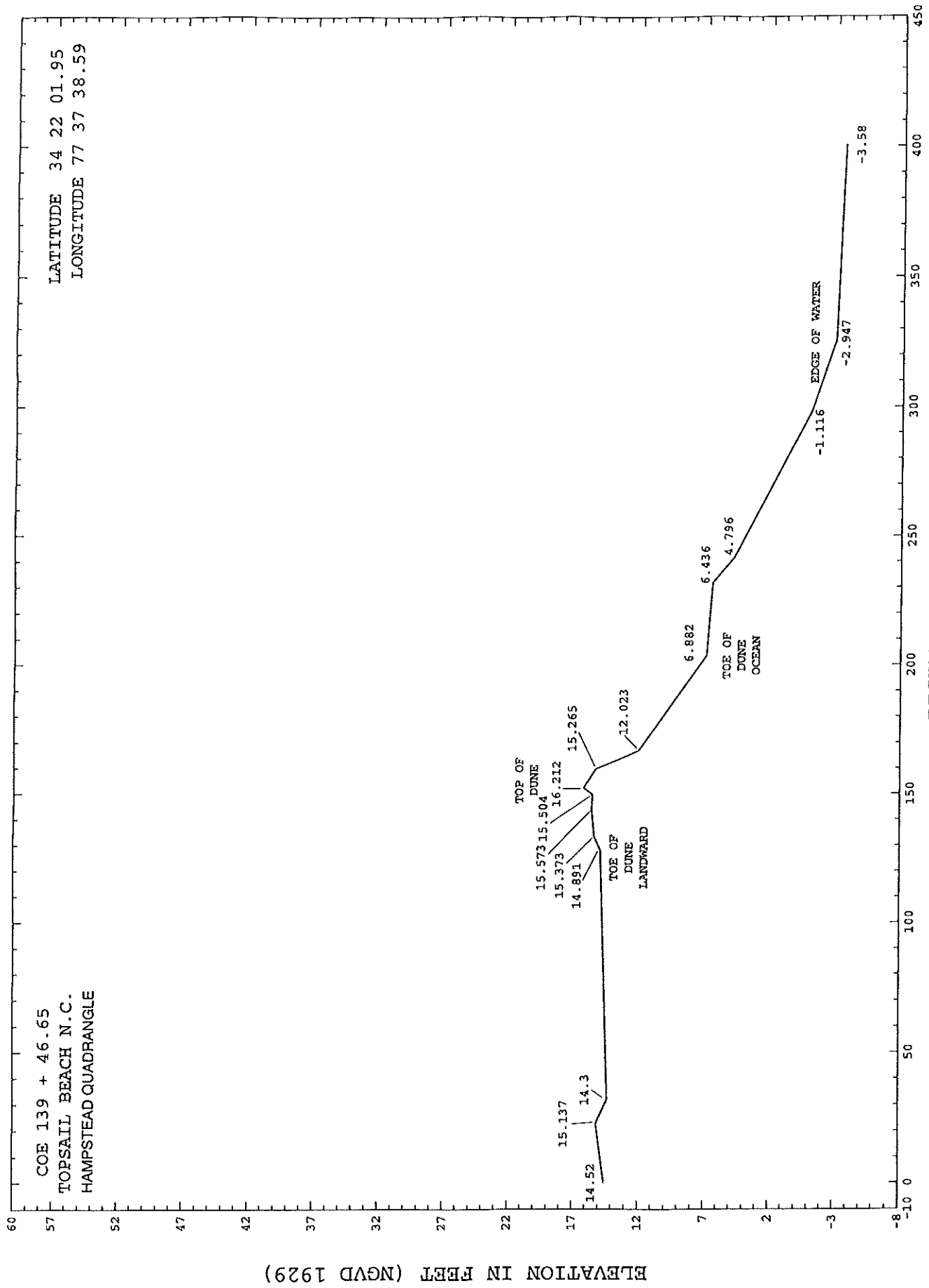
ELEVATION IN FEET (NGVD 1929)



PENDER COUNTY, NORTH CAROLINA
BEACH PROFILE 1

Beach profile data, Hurricane Bertha, July 1996.

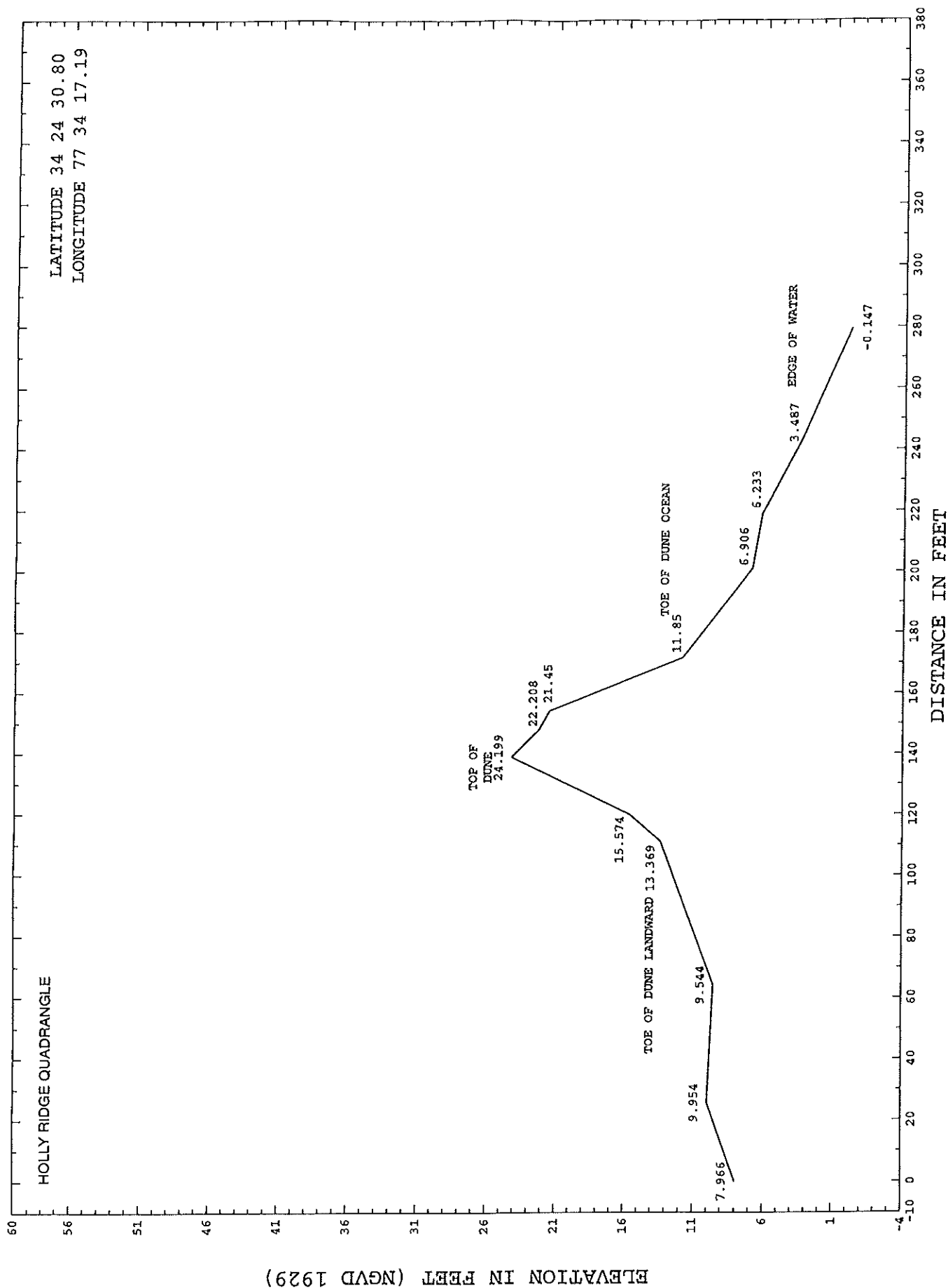
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Pender | 1 | 0 | 7.00 |
| Pender | 1 | 201.08 | 6.350 |
| Pender | 1 | 229.70 | 16.176 |
| Pender | 1 | 249.93 | 11.025 |
| Pender | 1 | 276.89 | 11.081 |
| Pender | 1 | 289.88 | 17.272 |
| Pender | 1 | 310.71 | 8.446 |
| Pender | 1 | 529.67 | -1.002 |
| Pender | 1 | 602.29 | -3.880 |



PENDER COUNTY, NORTH CAROLINA
BEACH PROFILE 2

Beach profile data, Hurricane Bertha, July 1996.

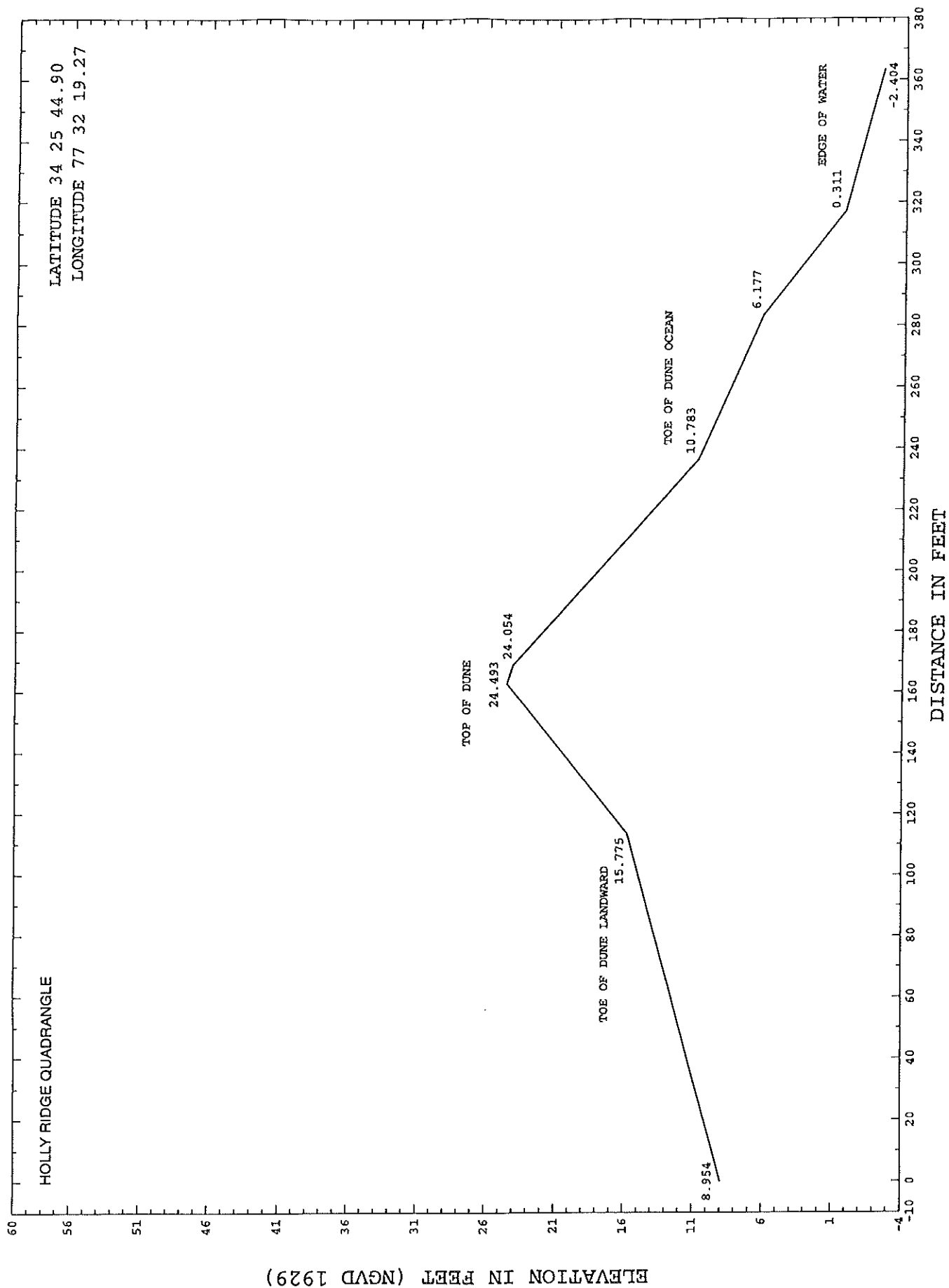
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Pender | 2 | 0 | 14.520 |
| Pender | 2 | 22.79 | 15.137 |
| Pender | 2 | 31.88 | 14.300 |
| Pender | 2 | 128.32 | 14.891 |
| Pender | 2 | 133.50 | 15.373 |
| Pender | 2 | 144.15 | 15.573 |
| Pender | 2 | 149.99 | 15.504 |
| Pender | 2 | 152.54 | 16.212 |
| Pender | 2 | 159.90 | 15.265 |
| Pender | 2 | 166.93 | 12.023 |
| Pender | 2 | 203.82 | 6.882 |
| Pender | 2 | 231.97 | 6.436 |
| Pender | 2 | 241.73 | 4.796 |
| Pender | 2 | 298.29 | -1.116 |
| Pender | 2 | 325.58 | -2.947 |
| Pender | 2 | 400.44 | -3.580 |



PENDER COUNTY, NORTH CAROLINA
BEACH PROFILE 3

Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Pender | 3 | 0 | 7.966 |
| Pender | 3 | 25.64 | 9.954 |
| Pender | 3 | 64.34 | 9.544 |
| Pender | 3 | 111.34 | 13.369 |
| Pender | 3 | 120.09 | 15.574 |
| Pender | 3 | 139.18 | 24.199 |
| Pender | 3 | 148.25 | 22.208 |
| Pender | 3 | 154.42 | 21.450 |
| Pender | 3 | 171.78 | 11.850 |
| Pender | 3 | 201.16 | 6.906 |
| Pender | 3 | 218.99 | 6.233 |
| Pender | 3 | 242.58 | 3.487 |
| Pender | 3 | 279.45 | -0.147 |

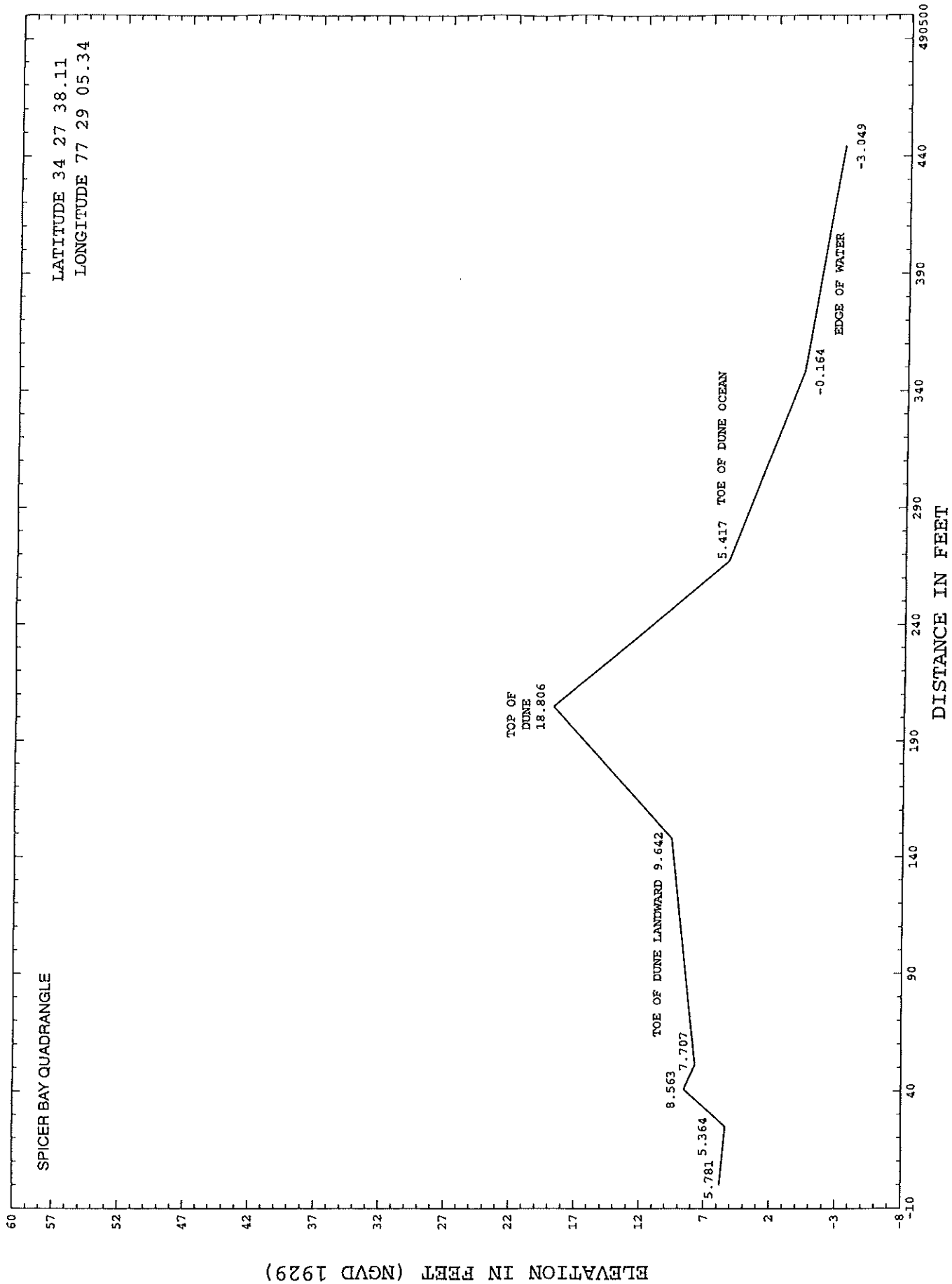


PENDER COUNTY, NORTH CAROLINA
BEACH PROFILE 4

Beach profile data, Hurricane Bertha, July 1996.

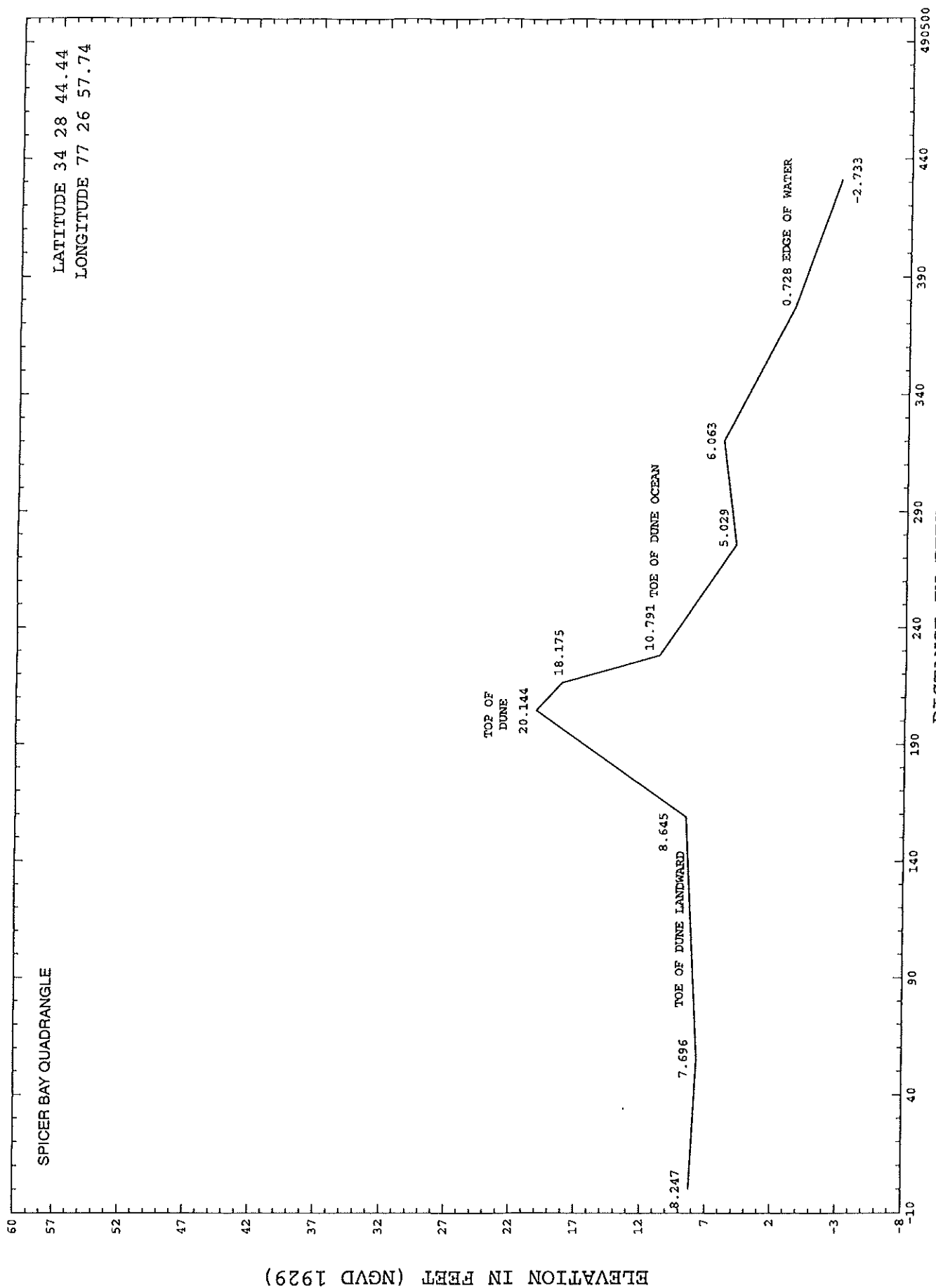
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Pender | 4 | 0 | 8.954 |
| Pender | 4 | 113.88 | 15.775 |
| Pender | 4 | 163.00 | 24.493 |
| Pender | 4 | 169.20 | 24.054 |
| Pender | 4 | 236.60 | 10.783 |
| Pender | 4 | 283.65 | 6.177 |
| Pender | 4 | 317.16 | 0.311 |
| Pender | 4 | 363.41 | -2.404 |

**ONSLOW COUNTY
BEACH PROFILES**



Beach profile data, Hurricane Bertha, July 1996.

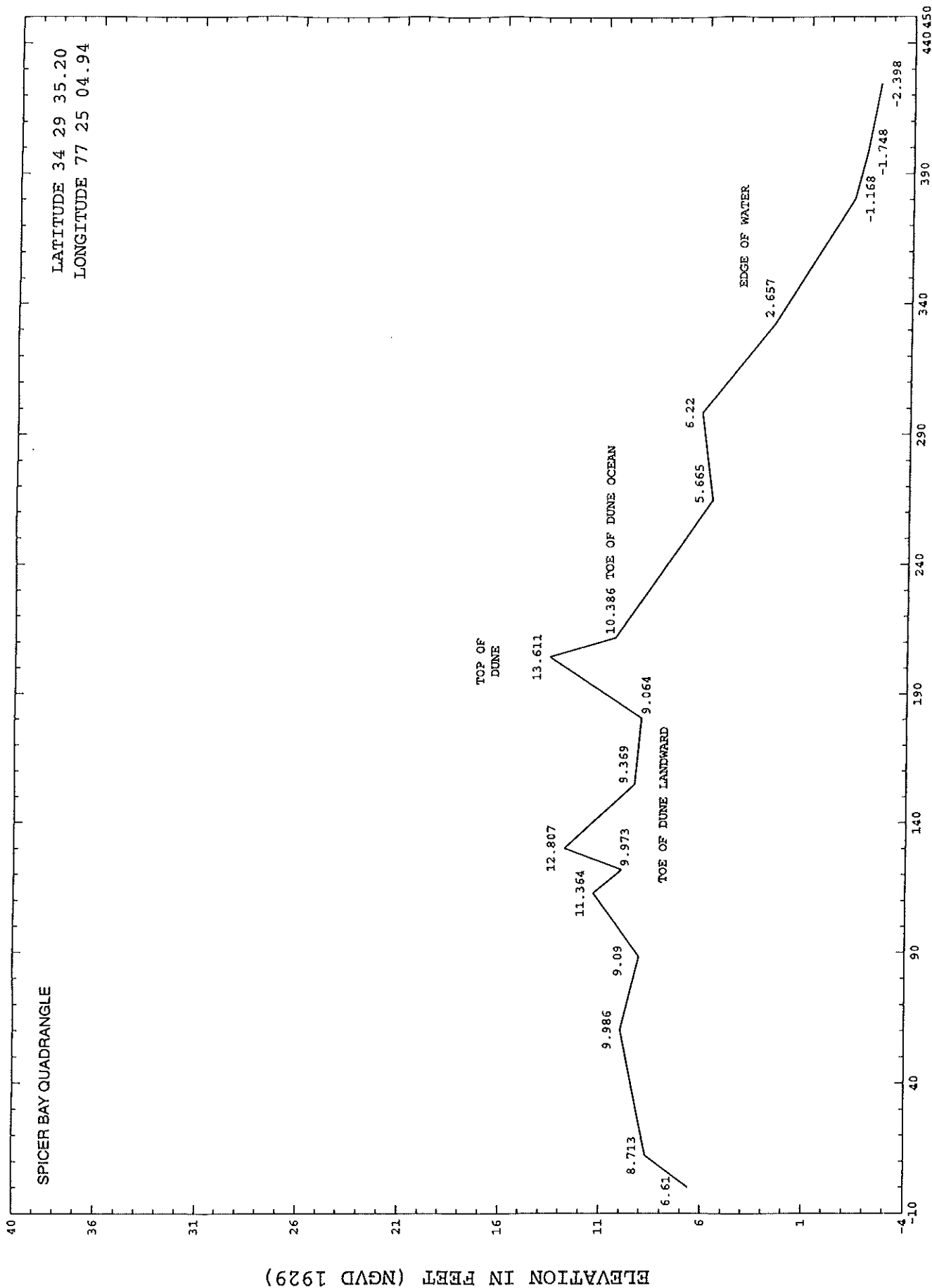
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Onslow | 1 | 0 | 5.781 |
| Onslow | 1 | 24.92 | 5.364 |
| Onslow | 1 | 40.85 | 8.563 |
| Onslow | 1 | 51.23 | 7.707 |
| Onslow | 1 | 148.18 | 9.642 |
| Onslow | 1 | 205.21 | 18.806 |
| Onslow | 1 | 267.50 | 5.417 |
| Onslow | 1 | 348.36 | -0.164 |
| Onslow | 1 | 444.27 | -3.049 |



ONslow COUNTY, NORTH CAROLINA
BEACH PROFILE 2

Beach profile data, Hurricane Bertha, July 1996.

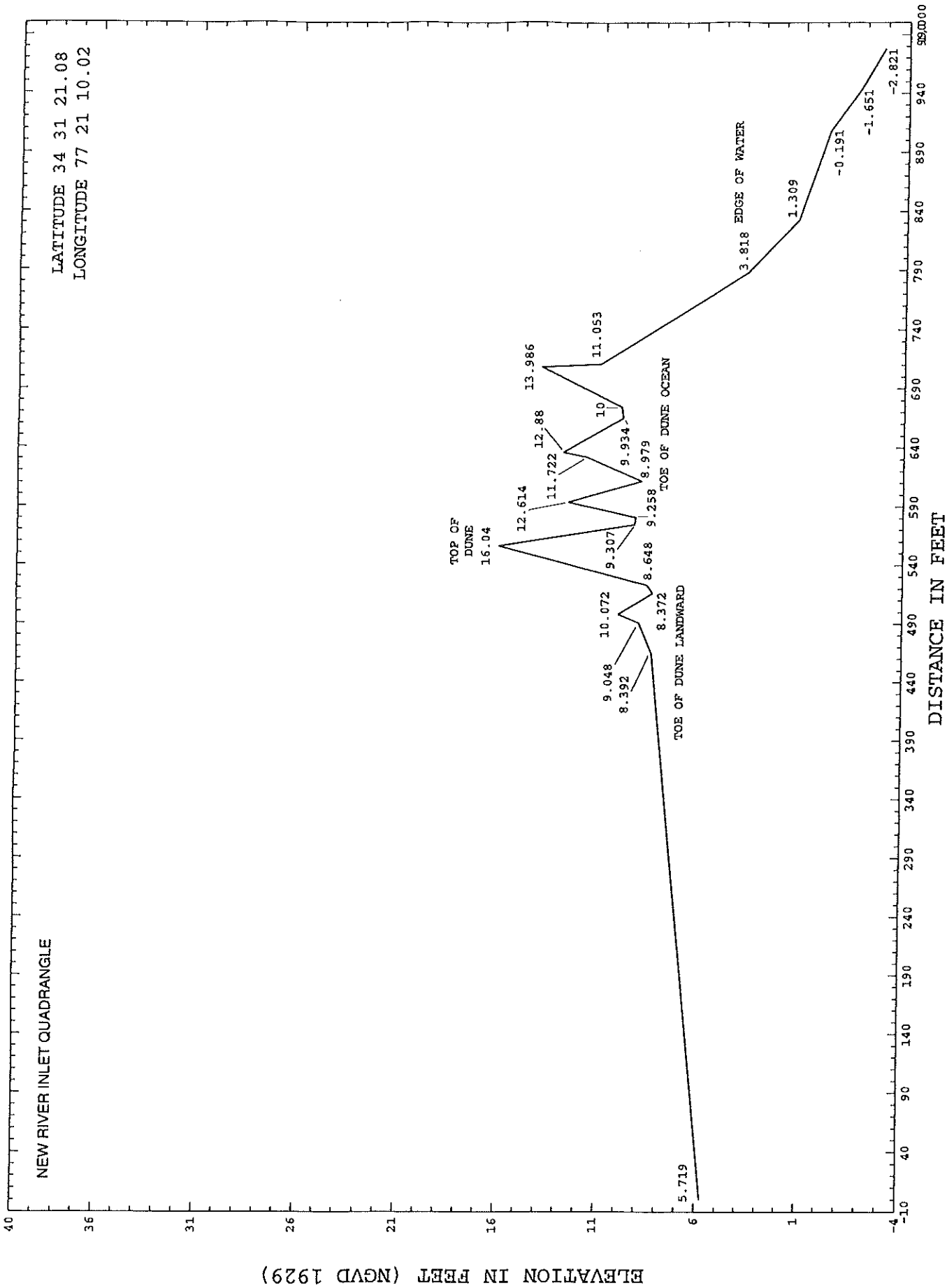
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Onslow | 2 | 0 | 8.247 |
| Onslow | 2 | 55.61 | 7.696 |
| Onslow | 2 | 159.18 | 8.645 |
| Onslow | 2 | 204.81 | 20.144 |
| Onslow | 2 | 216.81 | 18.175 |
| Onslow | 2 | 228.50 | 10.791 |
| Onslow | 2 | 276.12 | 5.029 |
| Onslow | 2 | 320.53 | 6.063 |
| Onslow | 2 | 377.23 | 0.728 |
| Onslow | 2 | 431.11 | -2.733 |



ONSLow COUNTY, NORTH CAROLINA
BEACH PROFILE 3

Beach profile data, Hurricane Bertha, July 1996.

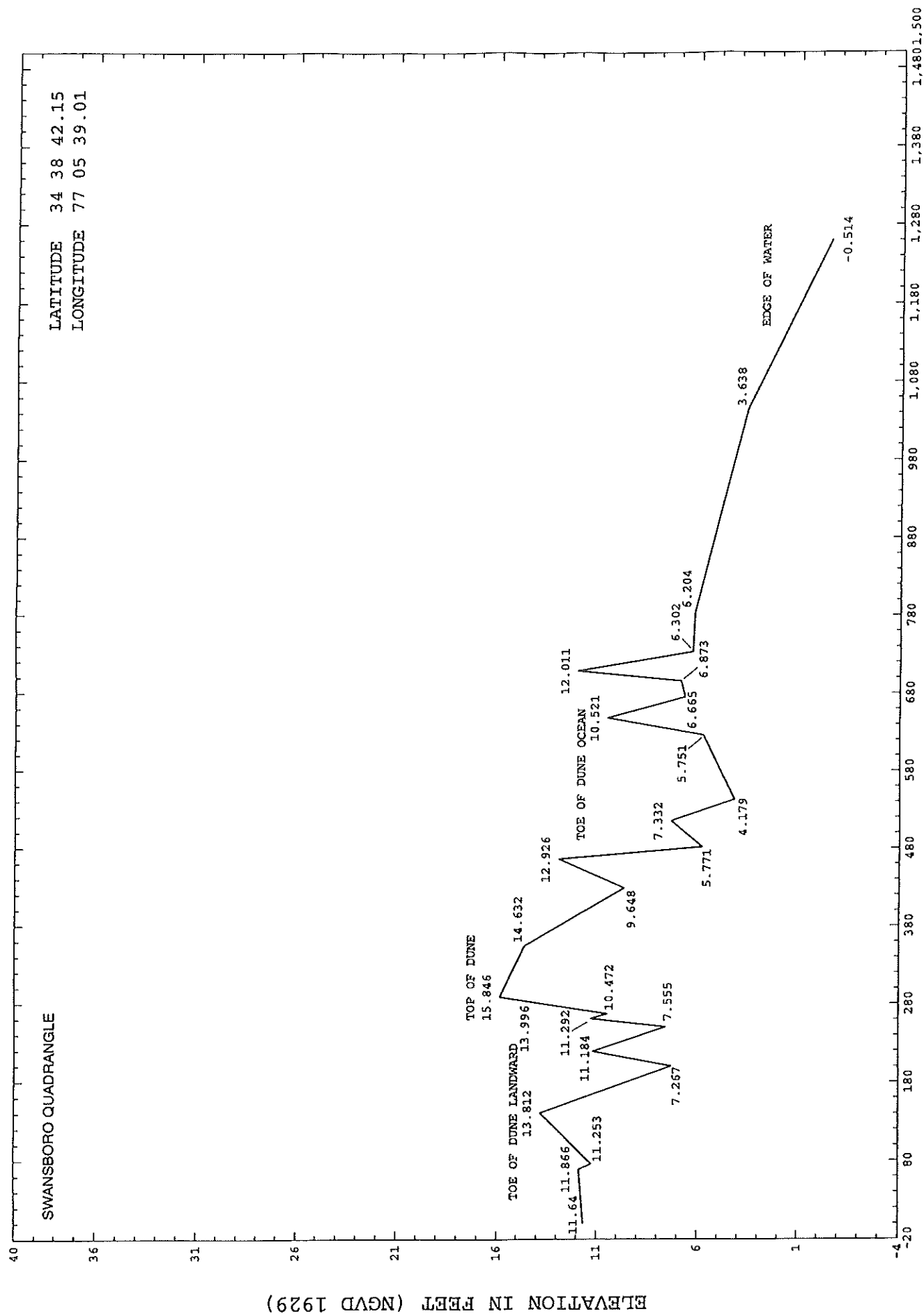
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Onslow | 3 | 0 | 6.610 |
| Onslow | 3 | 12.26 | 8.713 |
| Onslow | 3 | 60.55 | 9.986 |
| Onslow | 3 | 88.54 | 9.090 |
| Onslow | 3 | 113.03 | 11.364 |
| Onslow | 3 | 122.08 | 9.973 |
| Onslow | 3 | 130.38 | 12.807 |
| Onslow | 3 | 155.11 | 9.369 |
| Onslow | 3 | 180.83 | 9.064 |
| Onslow | 3 | 204.65 | 13.611 |
| Onslow | 3 | 211.97 | 10.386 |
| Onslow | 3 | 264.97 | 5.665 |
| Onslow | 3 | 298.55 | 6.220 |
| Onslow | 3 | 332.69 | 2.657 |
| Onslow | 3 | 380.41 | -1.168 |
| Onslow | 3 | 398.33 | -1.748 |
| Onslow | 3 | 424.47 | -2.398 |



Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|--------|-----------|----------|------------------------------|
| Onslow | 4 | 0 | 5.719 |
| Onslow | 4 | 464.73 | 8.392 |
| Onslow | 4 | 491.29 | 9.048 |
| Onslow | 4 | 498.77 | 10.072 |
| Onslow | 4 | 516.48 | 8.372 |
| Onslow | 4 | 523.36 | 8.648 |
| Onslow | 4 | 556.66 | 16.040 |
| Onslow | 4 | 574.99 | 9.307 |
| Onslow | 4 | 581.25 | 9.258 |
| Onslow | 4 | 594.17 | 12.614 |
| Onslow | 4 | 611.98 | 8.979 |
| Onslow | 4 | 632.35 | 11.722 |
| Onslow | 4 | 636.32 | 12.880 |
| Onslow | 4 | 665.19 | 9.934 |
| Onslow | 4 | 674.70 | 10.00 |
| Onslow | 4 | 708.74 | 13.986 |
| Onslow | 4 | 710.96 | 11.053 |
| Onslow | 4 | 788.41 | 3.818 |
| Onslow | 4 | 832.54 | 1.309 |
| Onslow | 4 | 907.84 | -0.191 |
| Onslow | 4 | 942.88 | -1.651 |
| Onslow | 4 | 977.78 | -2.821 |

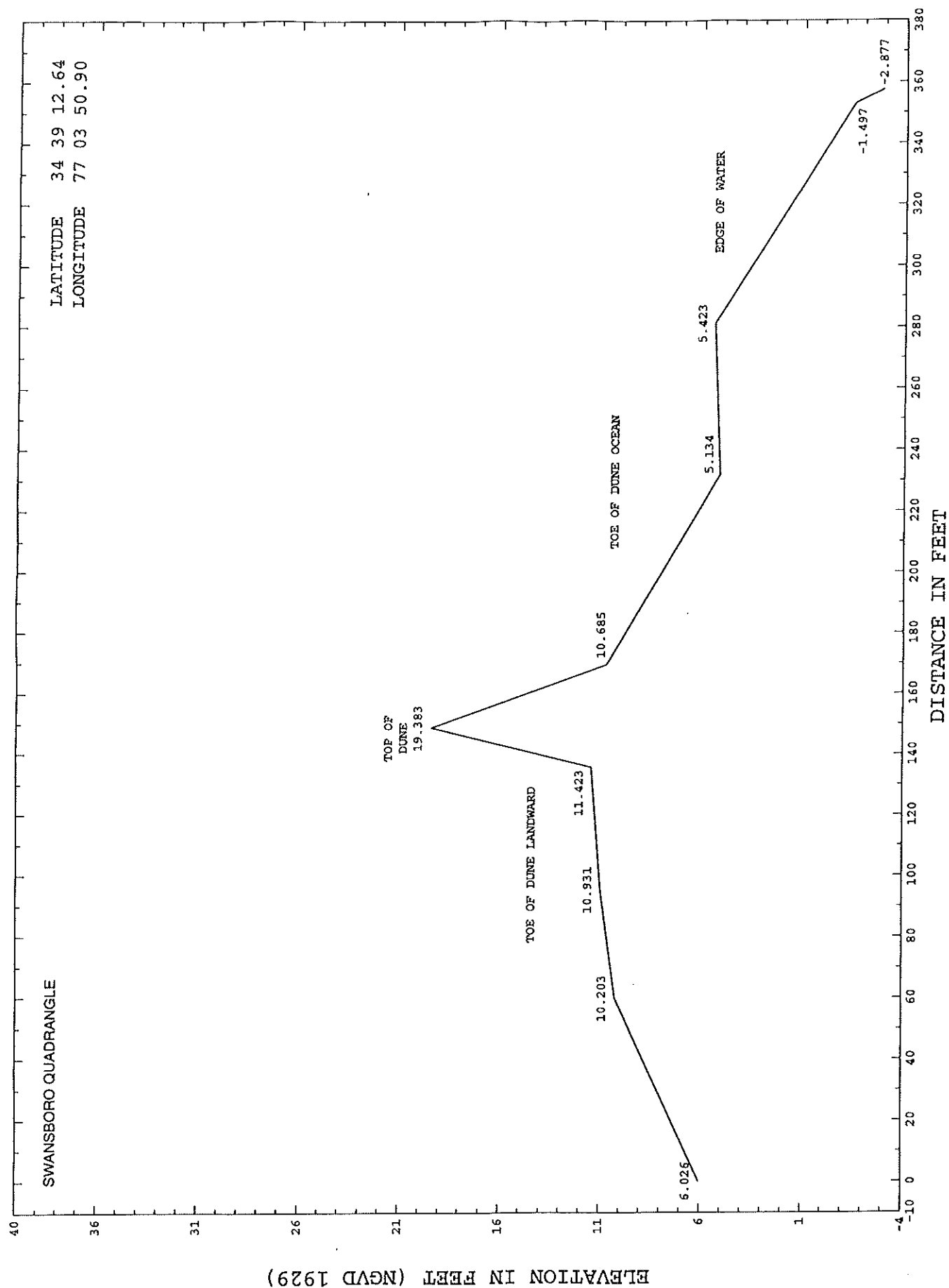
**CARTERET COUNTY
BEACH PROFILES**



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 1

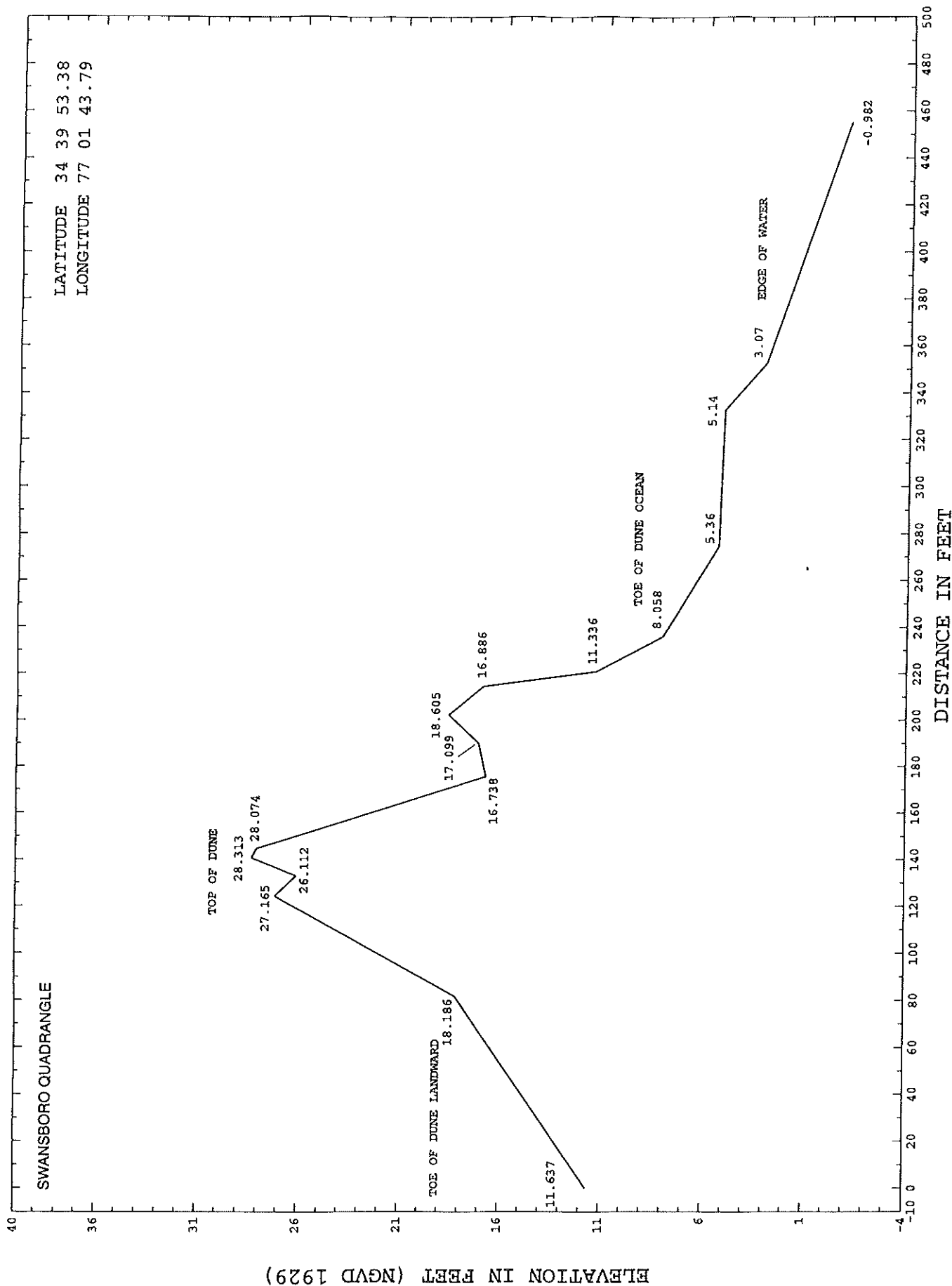
Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 1 | 0 | 11.640 |
| Carteret | 1 | 69.17 | 11.866 |
| Carteret | 1 | 75.97 | 11.253 |
| Carteret | 1 | 141.03 | 13.812 |
| Carteret | 1 | 200.85 | 7.267 |
| Carteret | 1 | 219.61 | 11.184 |
| Carteret | 1 | 250.99 | 7.555 |
| Carteret | 1 | 261.61 | 11.292 |
| Carteret | 1 | 267.61 | 10.472 |
| Carteret | 1 | 281.74 | 13.996 |
| Carteret | 1 | 289.09 | 15.846 |
| Carteret | 1 | 354.897 | 14.632 |
| Carteret | 1 | 429.60 | 9.648 |
| Carteret | 1 | 466.98 | 12.926 |
| Carteret | 1 | 482.39 | 5.771 |
| Carteret | 1 | 516.22 | 7.332 |
| Carteret | 1 | 543.59 | 4.179 |
| Carteret | 1 | 626.64 | 5.751 |
| Carteret | 1 | 649.12 | 10.521 |
| Carteret | 1 | 675.79 | 6.665 |
| Carteret | 1 | 696.41 | 6.873 |
| Carteret | 1 | 709.76 | 12.011 |
| Carteret | 1 | 733.93 | 6.302 |
| Carteret | 1 | 783.95 | 6.204 |
| Carteret | 1 | 1044.60 | 3.638 |
| Carteret | 1 | 1260.23 | -0.514 |



Beach profile data, Hurricane Bertha, July 1996.

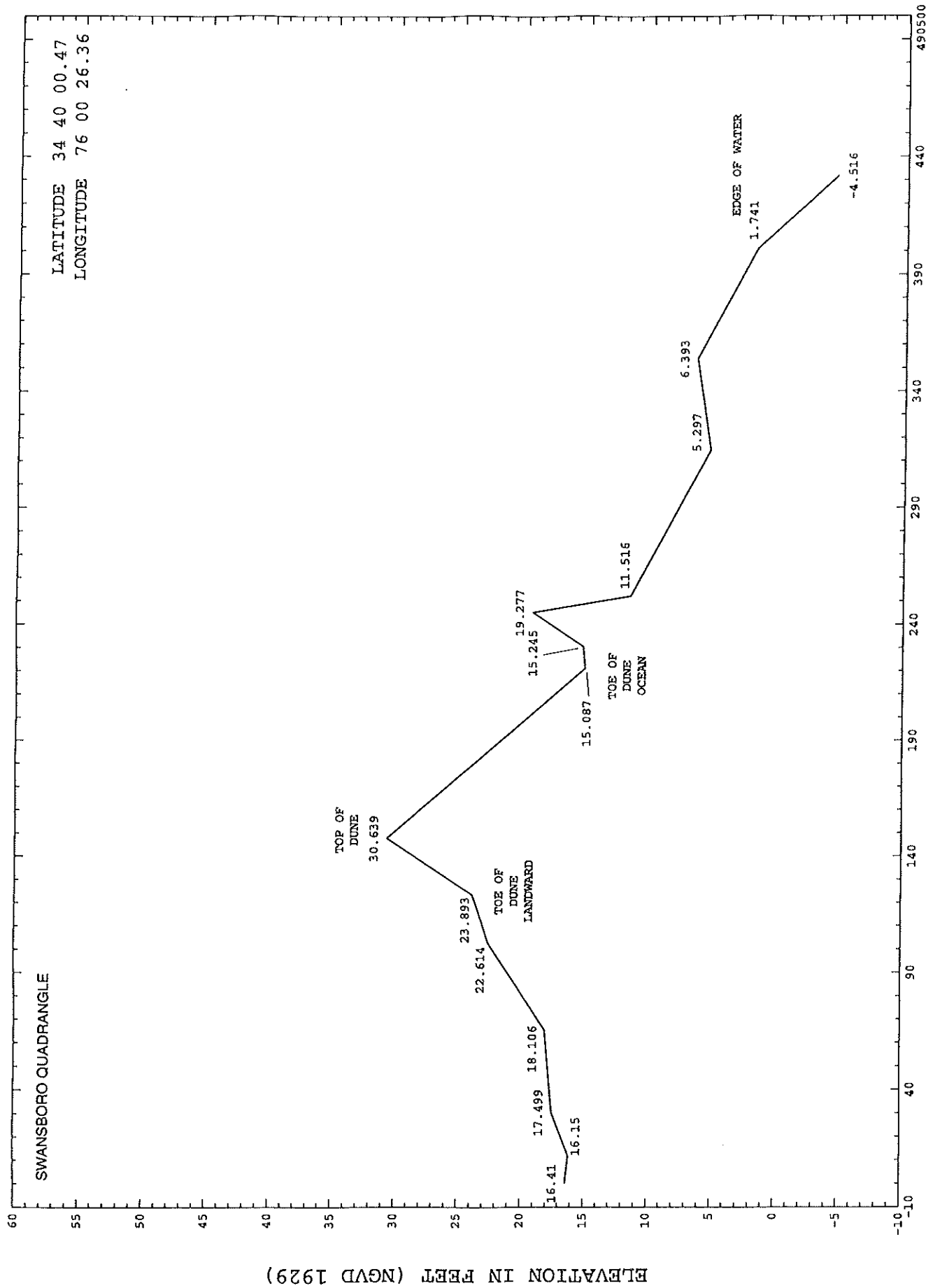
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 2 | 0 | 6.026 |
| Carteret | 2 | 59.96 | 10.203 |
| Carteret | 2 | 95.48 | 10.931 |
| Carteret | 2 | 135.77 | 11.423 |
| Carteret | 2 | 148.98 | 19.383 |
| Carteret | 2 | 169.68 | 10.685 |
| Carteret | 2 | 231.94 | 5.134 |
| Carteret | 2 | 281.34 | 5.423 |
| Carteret | 2 | 353.14 | -1.497 |
| Carteret | 2 | 357.42 | -2.877 |



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 3

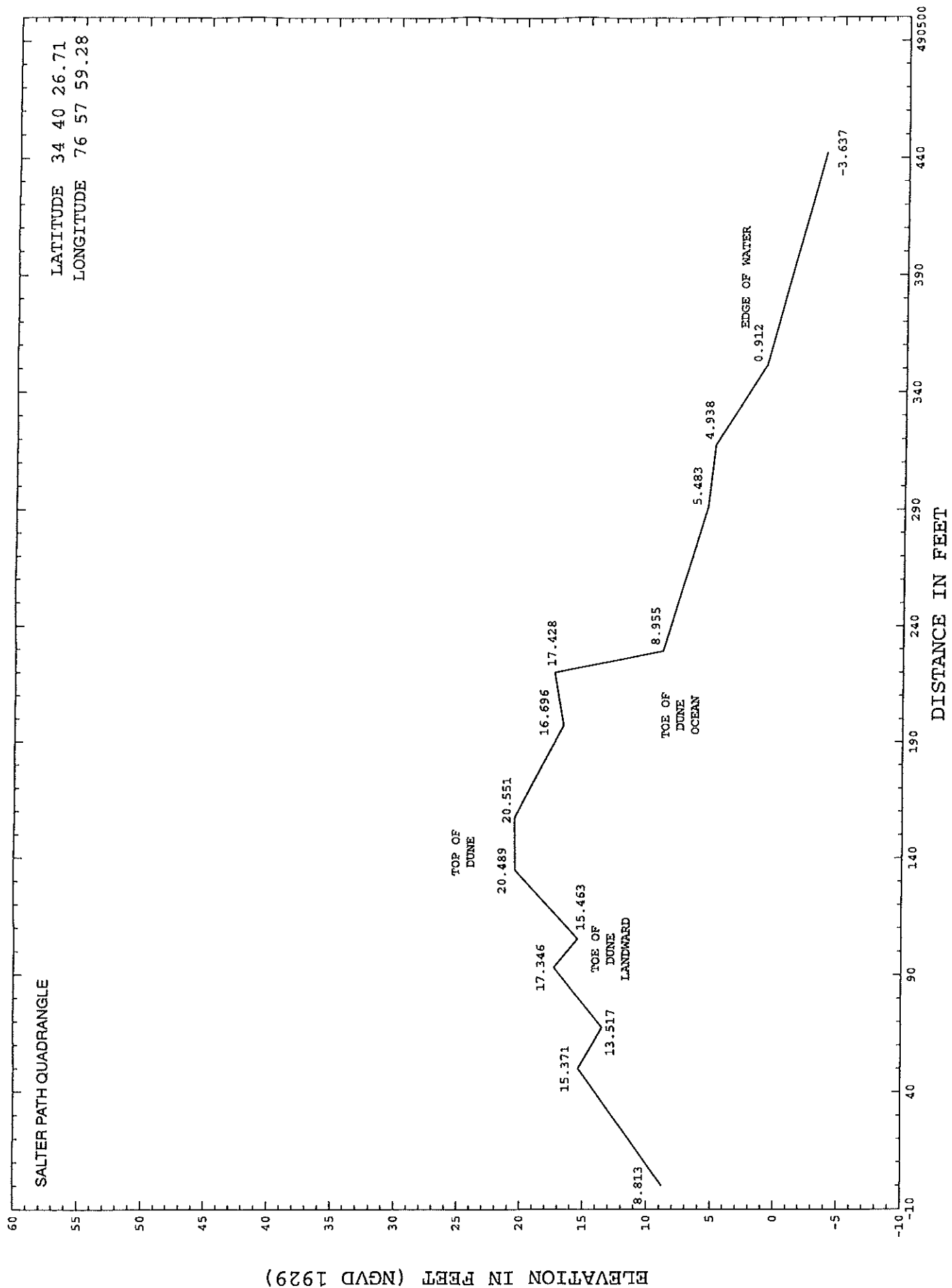
Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 3 | 0 | 11.637 |
| Carteret | 3 | 81.64 | 18.186 |
| Carteret | 3 | 124.24 | 27.165 |
| Carteret | 3 | 132.96 | 26.112 |
| Carteret | 3 | 140.63 | 28.313 |
| Carteret | 3 | 144.63 | 28.074 |
| Carteret | 3 | 175.74 | 16.738 |
| Carteret | 3 | 190.16 | 17.099 |
| Carteret | 3 | 202.38 | 18.605 |
| Carteret | 3 | 214.69 | 16.886 |
| Carteret | 3 | 221.05 | 11.336 |
| Carteret | 3 | 236.19 | 8.058 |
| Carteret | 3 | 274.88 | 5.360 |
| Carteret | 3 | 332.64 | 5.140 |
| Carteret | 3 | 352.90 | 3.070 |
| Carteret | 3 | 455.08 | -0.982 |



Beach profile data, Hurricane Bertha, July 1996.

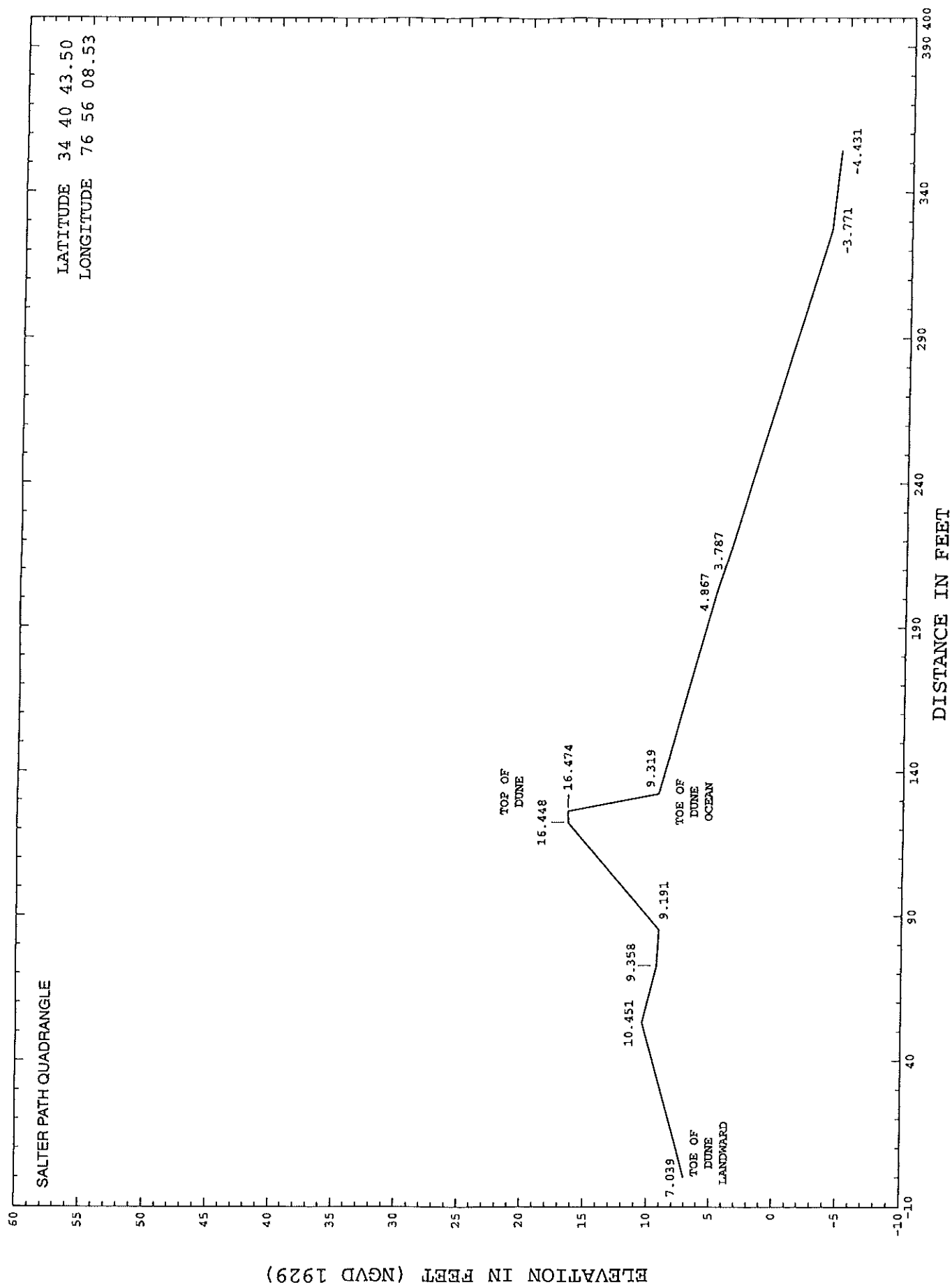
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 4 | 0 | 16.410 |
| Carteret | 4 | 11.61 | 16.150 |
| Carteret | 4 | 30.28 | 17.499 |
| Carteret | 4 | 65.42 | 18.106 |
| Carteret | 4 | 102.66 | 22.614 |
| Carteret | 4 | 123.43 | 23.893 |
| Carteret | 4 | 147.87 | 30.639 |
| Carteret | 4 | 221.39 | 15.087 |
| Carteret | 4 | 230.78 | 15.245 |
| Carteret | 4 | 245.40 | 19.277 |
| Carteret | 4 | 252.34 | 11.516 |
| Carteret | 4 | 314.85 | 5.297 |
| Carteret | 4 | 354.06 | 6.393 |
| Carteret | 4 | 401.10 | 1.741 |
| Carteret | 4 | 431.72 | -4.516 |



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 5

Beach profile data, Hurricane Bertha, July 1996.

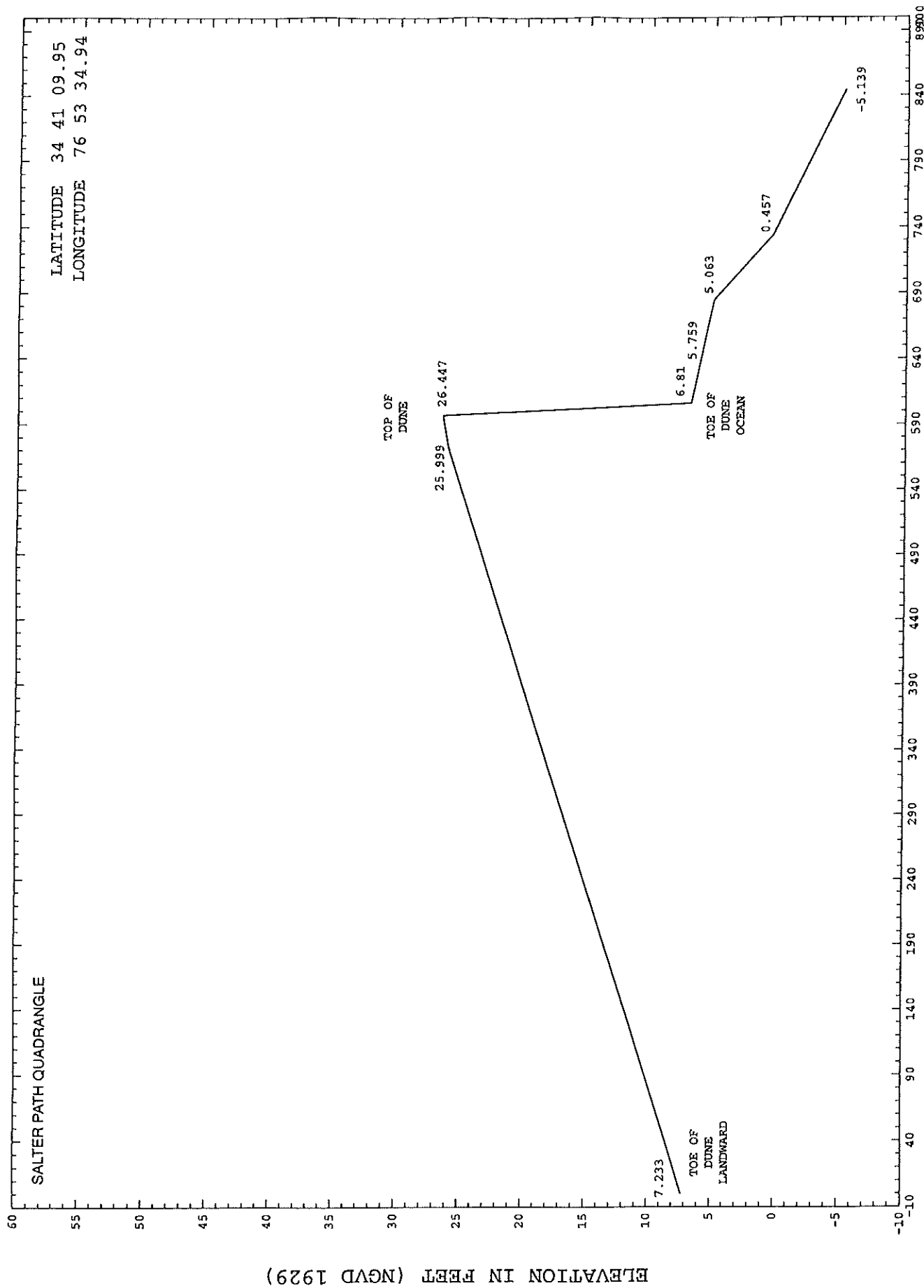
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 5 | 0 | 8.813 |
| Carteret | 5 | 50.09 | 15.371 |
| Carteret | 5 | 67.64 | 13.517 |
| Carteret | 5 | 93.34 | 17.346 |
| Carteret | 5 | 105.52 | 15.463 |
| Carteret | 5 | 134.97 | 20.489 |
| Carteret | 5 | 157.52 | 20.551 |
| Carteret | 5 | 197.50 | 16.696 |
| Carteret | 5 | 220.29 | 17.428 |
| Carteret | 5 | 229.50 | 8.955 |
| Carteret | 5 | 291.49 | 5.483 |
| Carteret | 5 | 317.53 | 4.938 |
| Carteret | 5 | 351.78 | 0.912 |
| Carteret | 5 | 442.25 | -3.637 |



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 6

Beach profile data, Hurricane Bertha, July 1996.

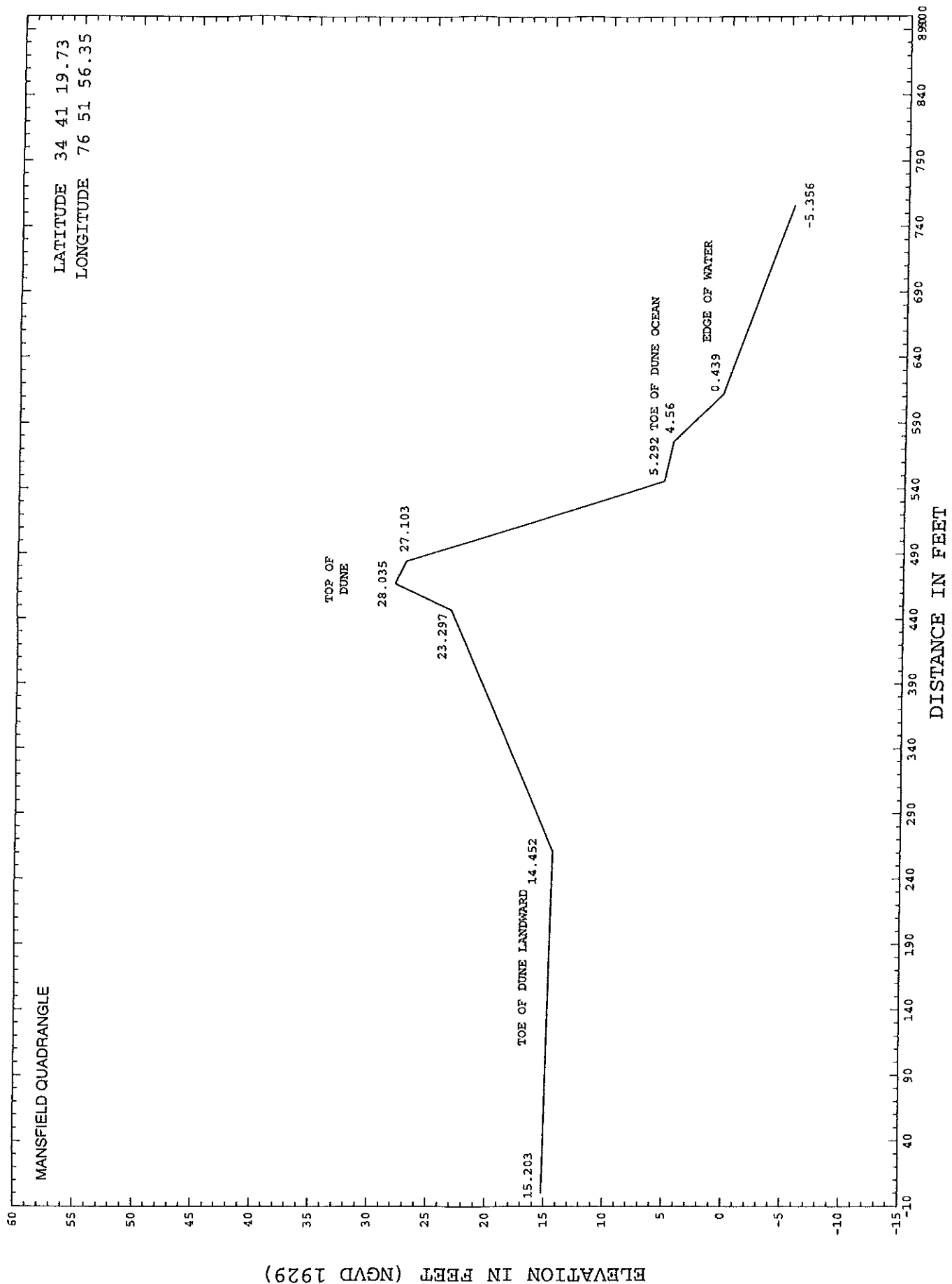
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 6 | 0 | 7.039 |
| Carteret | 6 | 53.12 | 10.451 |
| Carteret | 6 | 72.53 | 9.358 |
| Carteret | 6 | 85.37 | 9.191 |
| Carteret | 6 | 122.56 | 16.448 |
| Carteret | 6 | 126.56 | 16.474 |
| Carteret | 6 | 132.56 | 9.319 |
| Carteret | 6 | 202.60 | 4.867 |
| Carteret | 6 | 216.88 | 3.787 |
| Carteret | 6 | 327.13 | -3.771 |
| Carteret | 6 | 354.28 | -4.431 |



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 7

Beach profile data, Hurricane Bertha, July 1996.

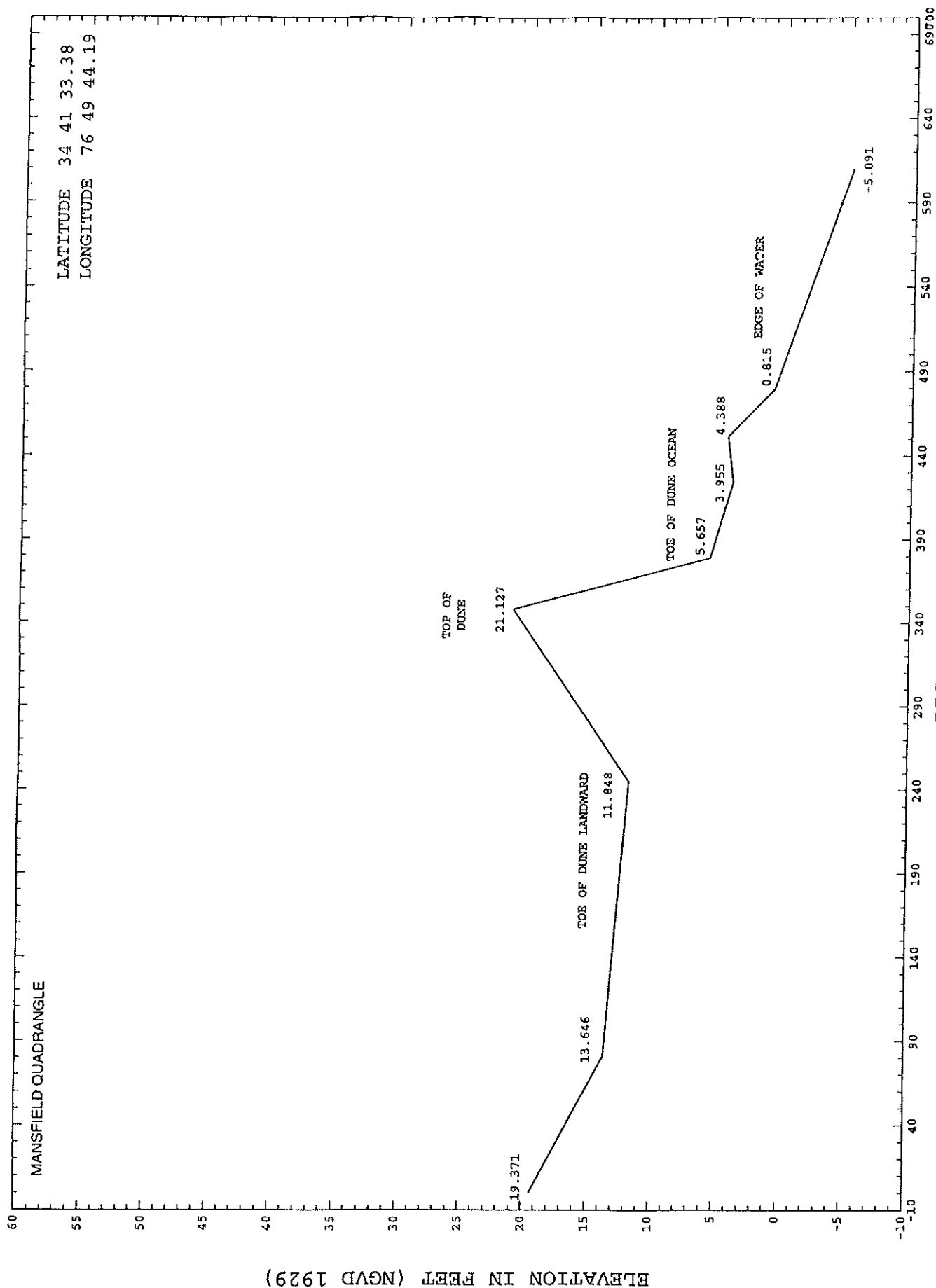
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 7 | 0 | 7.233 |
| Carteret | 7 | 572.43 | 25.999 |
| Carteret | 7 | 597.15 | 26.447 |
| Carteret | 7 | 606.16 | 6.81 |
| Carteret | 7 | 654.18 | 5.759 |
| Carteret | 7 | 684.60 | 5.063 |
| Carteret | 7 | 733.94 | 0.457 |
| Carteret | 7 | 844.31 | -5.139 |



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 8

Beach profile data, Hurricane Bertha, July 1996.

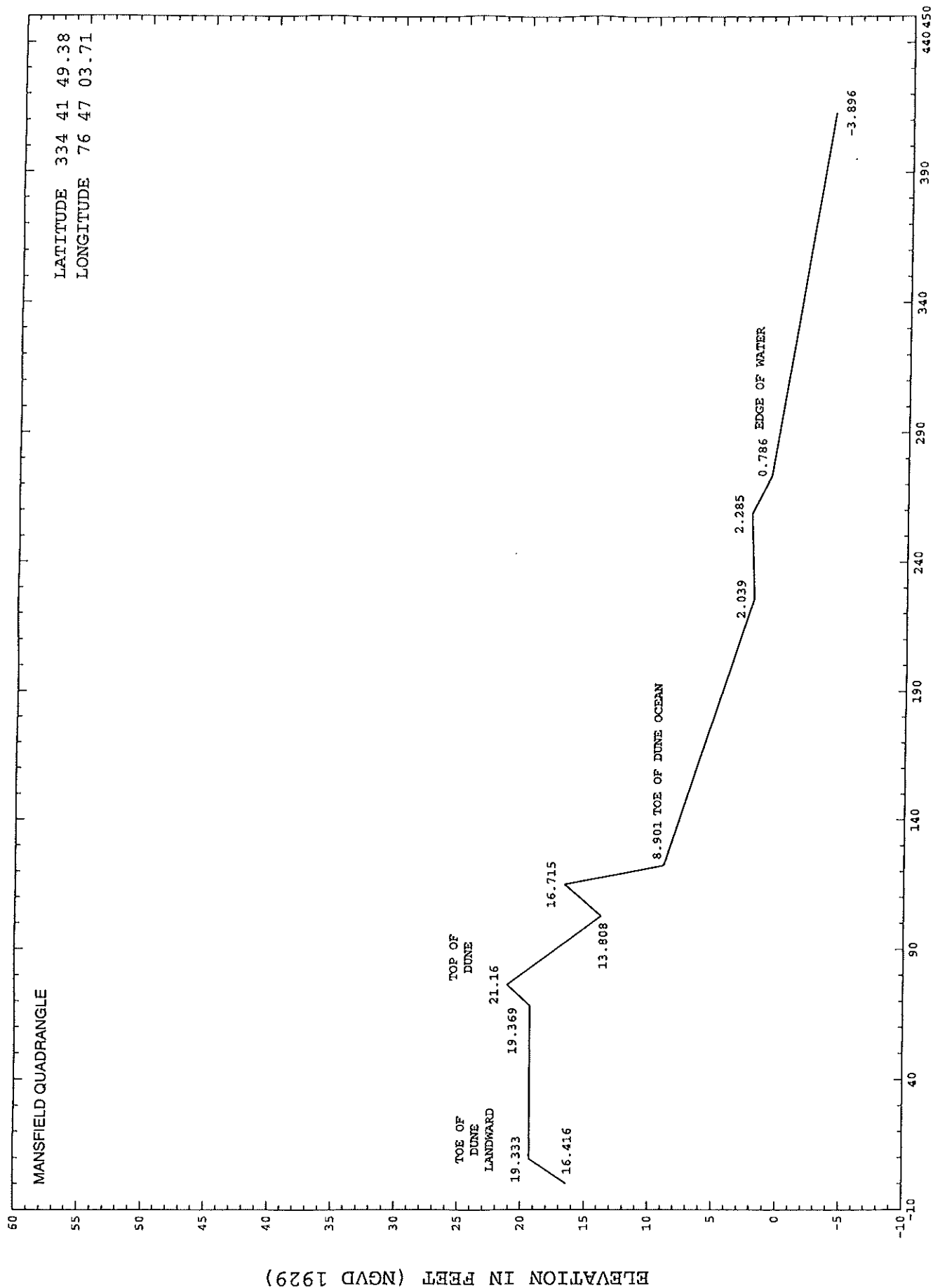
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 8 | 0 | 15.203 |
| Carteret | 8 | 261.29 | 14.452 |
| Carteret | 8 | 447.35 | 23.297 |
| Carteret | 8 | 467.67 | 28.035 |
| Carteret | 8 | 484.92 | 27.103 |
| Carteret | 8 | 546.23 | 5.292 |
| Carteret | 8 | 576.64 | 4.560 |
| Carteret | 8 | 612.64 | 0.439 |
| Carteret | 8 | 756.33 | -5.356 |



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 9

Beach profile data, Hurricane Bertha, July 1996.

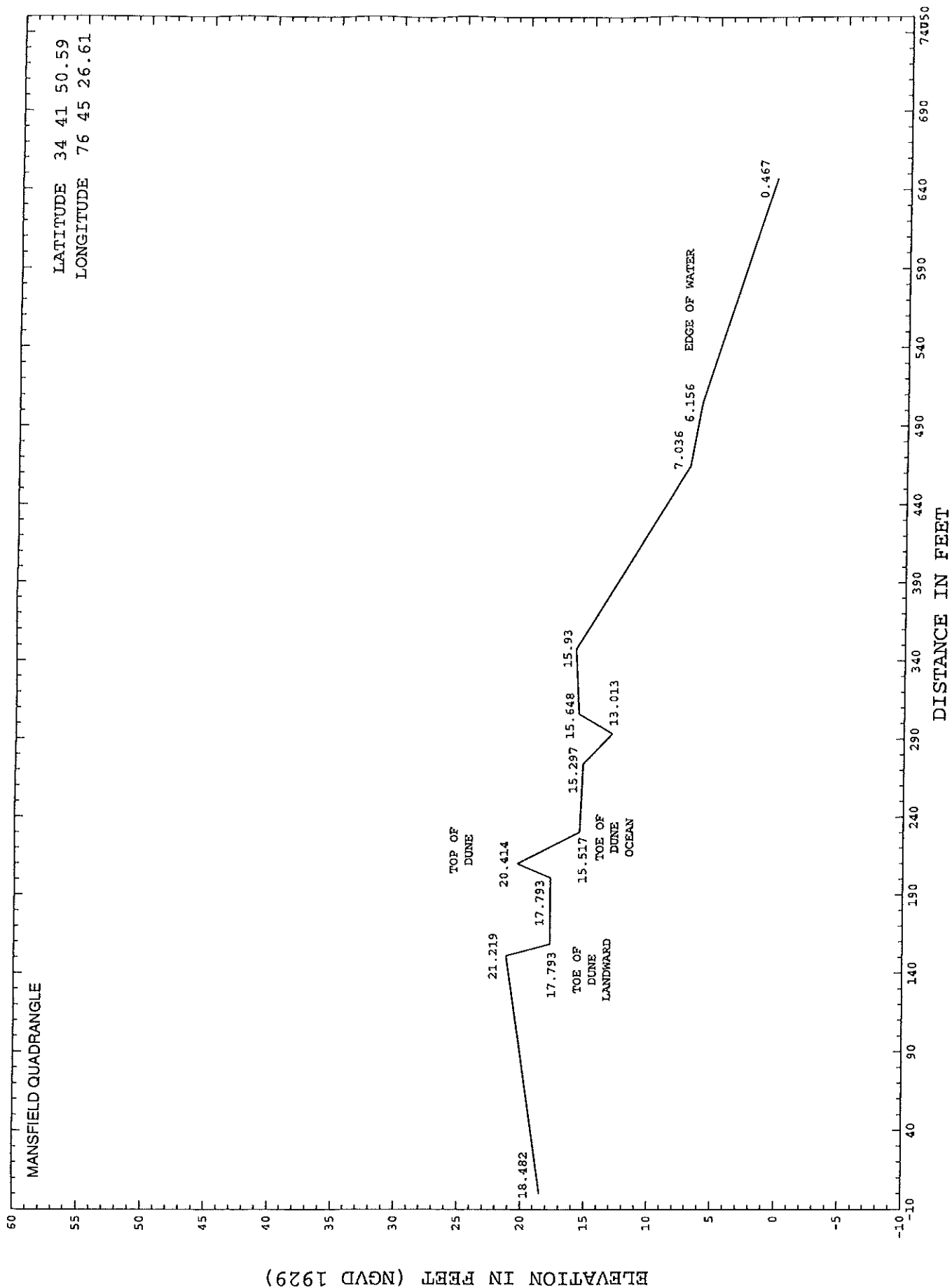
| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 9 | 0 | 19.371 |
| Carteret | 9 | 81.12 | 13.646 |
| Carteret | 9 | 245.12 | 11.848 |
| Carteret | 9 | 348.45 | 21.127 |
| Carteret | 9 | 379.34 | 5.657 |
| Carteret | 9 | 424.31 | 3.955 |
| Carteret | 9 | 451.76 | 4.388 |
| Carteret | 9 | 479.84 | 0.815 |
| Carteret | 9 | 609.57 | -5.091 |



CARTERET COUNTY, NORTH CAROLINA
BEACH PROFILE 10

Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 10 | 0 | 16.416 |
| Carteret | 10 | 9.51 | 19.333 |
| Carteret | 10 | 68.41 | 19.369 |
| Carteret | 10 | 76.41 | 21.160 |
| Carteret | 10 | 102.97 | 13.808 |
| Carteret | 10 | 115.12 | 16.715 |
| Carteret | 10 | 122.52 | 8.901 |
| Carteret | 10 | 226.04 | 2.039 |
| Carteret | 10 | 258.87 | 2.285 |
| Carteret | 10 | 273.48 | 0.786 |
| Carteret | 10 | 412.97 | -3.896 |



CARTERET COUNTY, NORTH CAROLINA
 BEACH PROFILE 11

Beach profile data, Hurricane Bertha, July 1996.

| COUNTY | PROFILE # | DISTANCE | ELEVATION (NGVD, in feet) |
|----------|-----------|----------|------------------------------|
| Carteret | 11 | 0 | 18.482 |
| Carteret | 11 | 151.13 | 21.219 |
| Carteret | 11 | 158.57 | 17.793 |
| Carteret | 11 | 201.09 | 17.793 |
| Carteret | 11 | 210.11 | 20.414 |
| Carteret | 11 | 230.65 | 15.517 |
| Carteret | 11 | 274.31 | 15.297 |
| Carteret | 11 | 293.63 | 13.013 |
| Carteret | 11 | 306.21 | 15.648 |
| Carteret | 11 | 347.81 | 15.930 |
| Carteret | 11 | 465.16 | 7.036 |
| Carteret | 11 | 505.44 | 6.156 |
| Carteret | 11 | 647.20 | 0.467 |