

FIGURE 8.—Hardness of water in streams of North Carolina

EXPLANATION
Average hardness (expressed as CaCO₃), in milligrams per liter
0-10
11-30
31-60
61 or greater
Daily station • 10 - Maximum observed
3 - Minimum observed

HARDNESS

Water that does not lather readily with soap, and that forms curds, is described as being hard. Such water usually forms scale in boilers, and encrustations on cooking utensils, and may leave deposits in water lines. Hardness may be caused by a number of chemical constituents, but of these only calcium and magnesium are present in significant amounts in the surface waters of North Carolina. Calcium is usually present in larger concentrations than is magnesium.

According to this scale, unpolluted fresh surface water of North Carolina is soft except for that in a few streams in eastern North Carolina where drainage from limestone beds may make it moderately hard during low flow.

Average hardness of water in major streams in North Carolina is shown on figure 8.

The U.S. Geological Survey uses the following arbitrary ranges to classify the hardness of water:

Hardness as CaCO ₃	Classification
0 - 60 mg/l	Soft
61 - 120 mg/l	Moderately hard
121 - 180 mg/l	Hard
181+ mg/l	Very hard

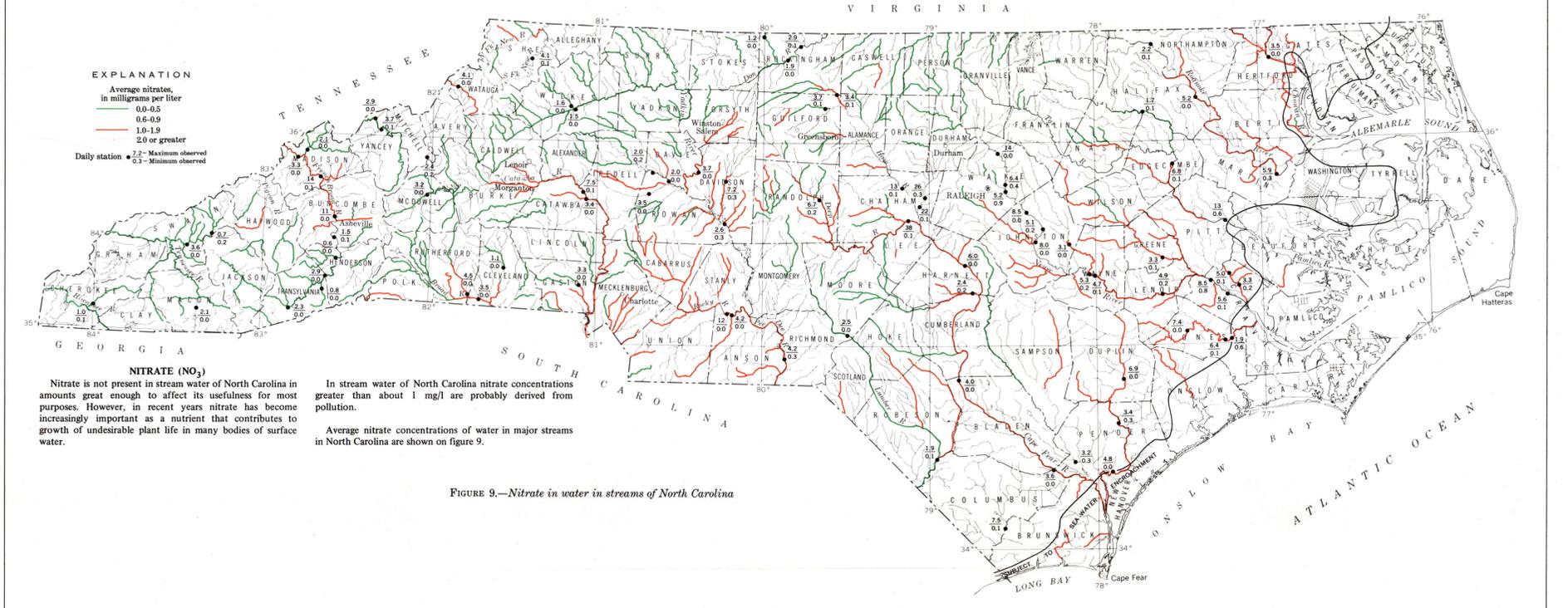


FIGURE 9.—Nitrate in water in streams of North Carolina

EXPLANATION
Average nitrate, in milligrams per liter
0.0-0.5
0.6-0.9
1.0-1.9
2.0 or greater
Daily station • 2.2 - Maximum observed
0.3 - Minimum observed

NITRATE (NO₃)

Nitrate is not present in stream water of North Carolina in amounts great enough to affect its usefulness for most purposes. However, in recent years nitrate has become increasingly important as a nutrient that contributes to growth of undesirable plant life in many bodies of surface water.

In stream water of North Carolina nitrate concentrations greater than about 1 mg/l are probably derived from pollution.

Average nitrate concentrations of water in major streams in North Carolina are shown on figure 9.

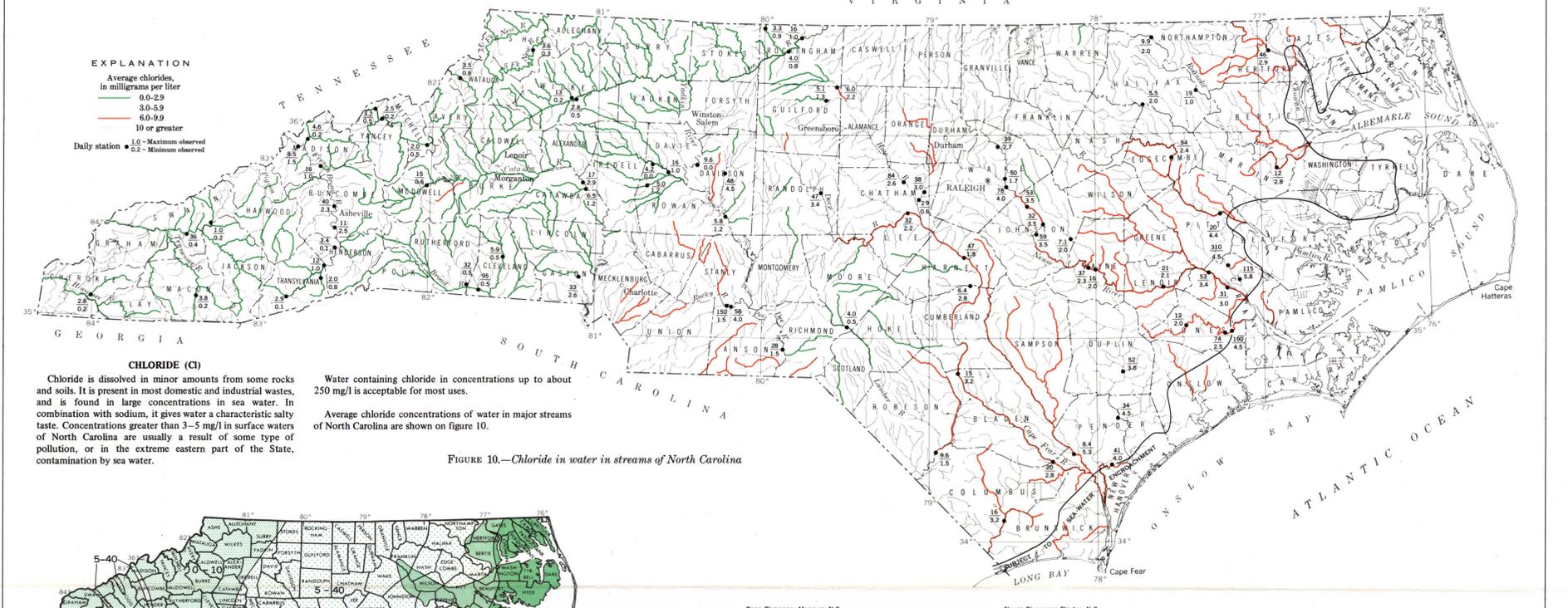


FIGURE 10.—Chloride in water in streams of North Carolina

EXPLANATION
Average chlorides, in milligrams per liter
0.0-2.9
3.0-5.9
6.0-9.9
10 or greater
Daily station • 1.0 - Maximum observed
0.2 - Minimum observed

CHLORIDE (Cl)

Chloride is dissolved in minor amounts from some rocks and soils. It is present in most domestic and industrial wastes, and is found in large concentrations in sea water. In combination with sodium, it gives water a characteristic salty taste. Concentrations greater than 3-5 mg/l in surface waters of North Carolina are usually a result of some type of pollution, or in the extreme eastern part of the State, contamination by sea water.

Water containing chloride in concentrations up to about 250 mg/l is acceptable for most uses.

Average chloride concentrations of water in major streams of North Carolina are shown on figure 10.



FIGURE 11.—Average color of water in streams of North Carolina

COLOR

Color in the surface waters of North Carolina is due to two principal causes: (1) decomposition of organic matter in swamps and sluggish streams, and (2) industrial pollution. The decomposed organic matter gives the water a brown tealike color. Natural color becomes barely detectable to the human eye at about 5 units, while weak tea has a color equivalent to about 300 units. Color due to industrial wastes is associated principally with textile dyeing operations.

In amounts up to about 15 units, color is not troublesome for most uses, but higher amounts become esthetically objectionable for drinking purposes and may stain clothing, porcelain fixtures, etc.

As shown on figure 11, color in surface waters of North Carolina may vary from near zero in the mountains to several hundred units in the swamps of the Coastal Plain.

LONG-TERM CHANGES IN STREAM QUALITY

Streams in North Carolina, although generally not highly polluted at present, are subject to progressive impairment of water quality, by the steady increase in the amount of municipal and industrial and agricultural waste discharged into them. The most sensitive chemical indicator of this impairment is chloride, which is a component of most of these wastes. Continuous long-term records are not available for showing the progressive increase in chloride throughout the State. However, for the three stations shown on figure 12, daily records are available that span slightly over two decades. A comparison of chloride concentrations versus stream discharge shows clearly that, at these locations, the amount of chloride carried by a given amount of water increased significantly from 1944 to 1966.

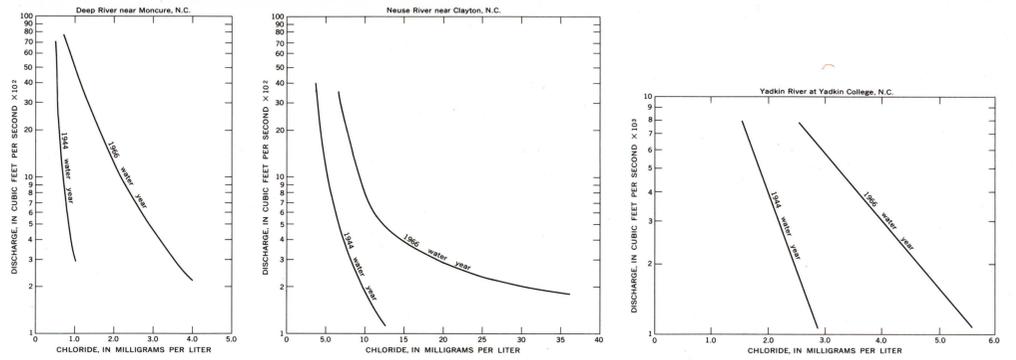


FIGURE 12.—Differences in chloride concentrations versus streamflow for selected stations between the 1944 water year and the 1966 water year.

CHEMICAL QUALITY OF WATER IN STREAMS OF NORTH CAROLINA

By
Hugh B. Wilder and Larry J. Slack
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