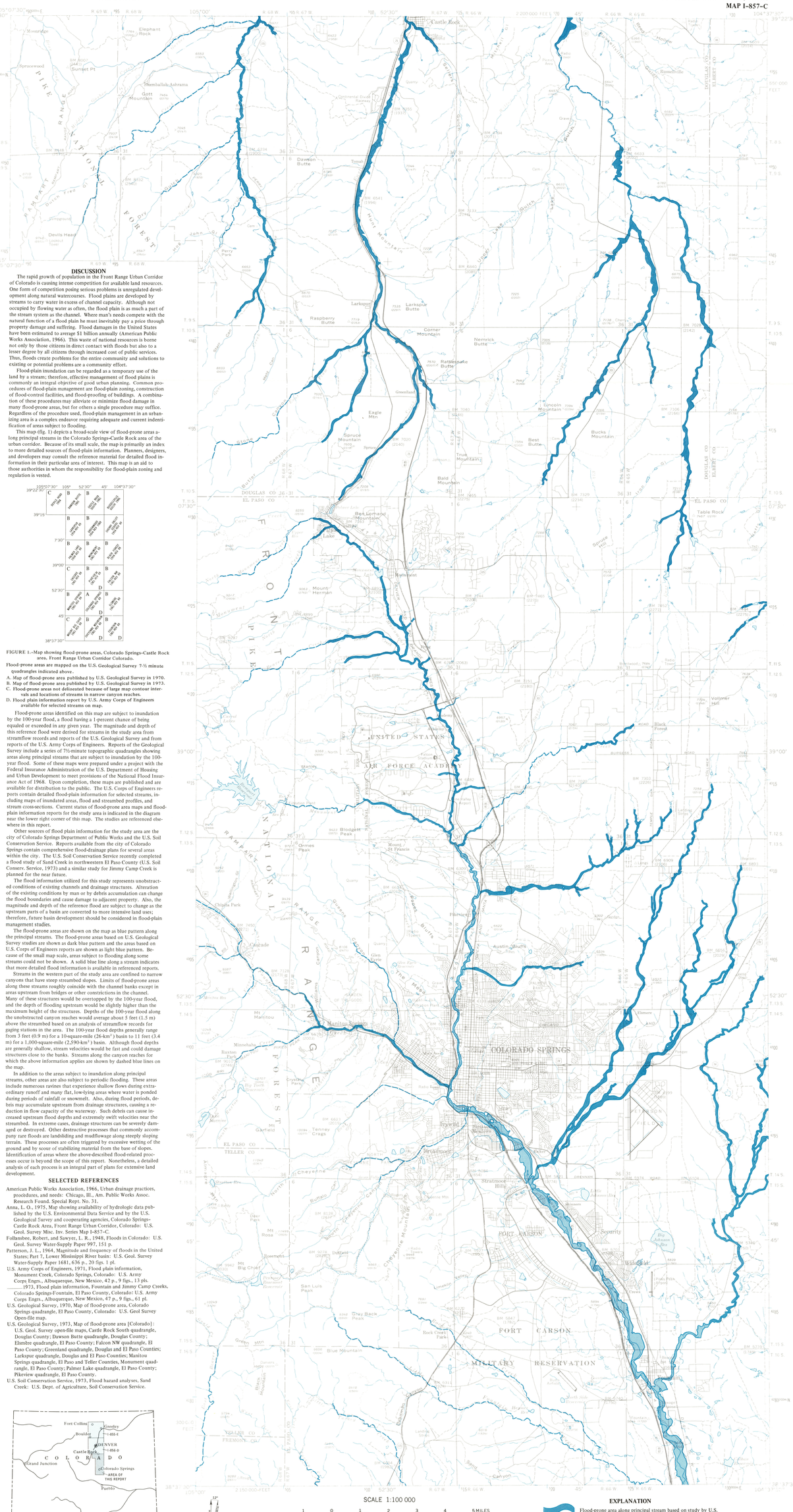

DISCUSSION

The rapid growth of population in the Front Range Urban Corridor of Colorado is causing intense competition for available land resources. One form of competition posing serious problems is unregulated development along natural watercourses. Flood plains are developed by streams to carry water in excess of channel capacity. Although not occupied by flowing water as often, the flood plain is as much a part of the stream system as the channel. Where man's needs compete with the natural function of a flood plain he must inevitably pay a price through property damage and suffering. Flood damages in the United States have been estimated to average $1 billion annually (American Public Works Association, 1966). This waste of national resources is borne not only by those citizens in direct contact with floods but also to a lesser degree by all citizens through increased cost of public services. Thus, floods create porblems for the entire community and solutions to existing or potential problems are a community effort.

Flood-plain inundation can be regarded as a temporary use of the land by a stream; therefore, effective management of flood plains is commonly an integral objective of good urban planning. Common procedures of flood-plain management are flood-plain zoning, construction of flood-control facilities, and flood-proofing of buildings. A combination of these procedures may alleviate or minimize flood damage in many flood-prone areas, but for others a single procedure may suffice. Regardless of the procedure used, flood-plain management in an urbanizing area is a complex endeavor requiring adequate and current indentification of areas subject to flooding.

This map (fig. 1) depicts a broad-scale view of flood-prone areas along principal streams in the Colorado Springs–Castle Rock area of the urban corridor. Because of its small scale, the map is primarily an index to more detailed sources of flood-plain information. Planners, designers, and developers may consult the reference material for detailed flood information in their particular area of interest. This map is an aid to those authorities in whom the responsibility for flood-plain zoning and regulation is vested.

FIGURE 1.–Map showing flood-prone areas, Colorado Springs–Castle Rock area, Front Range Urban Corridor Colorado.

Flood-prone areas are mapped on the U.S. Geological Survey 7-½ minute quadrangles indicated above.

A. Map of flood-prone area published by U.S. Geological Survey in 1970.
B. Map of flood-prone area published by U.S. Geological Survey in 1973.
C. Flood-prone areas not delineated because of large map contour intervals and locations of streams in narrow canyon reaches.
D. Flood plain information report by U.S. Army Corps of Engineers available for selected streams on map.

Flood-prone areas identified on this map are subject to inundation by the 100-year flood, a flood having a 1-percent chance of being equaled or exceeded in any given year. The magnitude and depth of this reference flood were derived for streams in the study area from streamflow records and reports of the U.S. Geological Survey and from reports of the U.S. Army Corps of Engineers. Reports of the Geological Survey include a series of 7½-minute topographic quadrangles showing areas along principal streams that are subject to inundation by the 100-year flood. Some of these maps were prepared under a project with the Federal Insurance Administration of the U.S. Department of Housing and Urban Development to meet provisions of the National Flood Insurance Act of 1968. Upon completion, these maps are published and are available for distribution to the public. The U.S. Corps of Engineers reports contain detailed flood-plain information for selected streams, including maps of inundated areas, flood and streambed profiles, and stream cross-sections. Current status of flood-prone area maps and flood-plain information reports for the study area is indicated in the diagram near the lower right corner of this map. The studies are referenced elsewhere in this report.

Other sources of flood plain information for the study area are the city of Colorado Springs Department of Public Works and the U.S. Soil Conservation Service. Reports available from the city of Colorado Springs contain comprehensive flood-drainage plans for several areas within the city. The U.S. Soil Conservation Service recently completed a flood study of Sand Creek in northwestern El Paso County (U.S. Soil Conserv. Service, 1973) and a similar study for Jimmy Camp Creek is planned for the near future.

The flood information utilized for this study represents unobstructed conditions of existing channels and drainage structures. Alteration of the existing conditions by man or by debris accumulation can change the flood boundaries and cause damage to adjacent property. Also, the magnitude and depth of the reference flood are subject to change as the upstream parts of a basin are converted to more intensive land uses; therefore, future basin development should be considered in flood-plain management studies.

The flood-prone areas are shown on the map as blue pattern along the principal streams. The flood-prone areas based on U.S. Geological Survey studies are shown as dark blue pattern and the areas based on U.S. Corps of Engineers reports are shown as light blue pattern. Because of the small map scale, areas subject to flooding along some streams could not be shown. A solid blue line along a stream indicates that more detailed flood information is available in referenced reports.

Streams in the western part of the study area are confined to narrow canyons that have steep streambed slopes. Limits of flood-prone areas along these streams roughly coincide with the channel banks except in areas upstream from bridges or other constrictions in the channel. Many of these structures would be overtopped by the 100-year flood, and the depth of flooding upstream would be slightly higher than the maximum height of the structures. Depths of the 100-year flood along the unobstructed canyon reaches would average about 5 feet (1.5 m) above the streambed based on an analysis of streamflow records for gaging stations in the area. The 100-year flood depths generally range from 3 feet (0.9 m) for a 10-square-mile (26-km^2) basin to 11 feet (3.4 m) for a 1,000-square-mile (2,590-km^2) basin. Although flood depths are generally shallow, stream velocities would be fast and could damage structures close to the banks. Streams along the canyon reaches for which the above information applies are shown by dashed blue lines on the map.

In addition to the areas subject to inundation along principal streams, other areas are also subject to periodic flooding. These areas include numerous ravines that experience shallow flows during extraordinary runoff and many flat, low-lying areas where water is ponded during periods of rainfall or snowmelt. Also, during flood periods, debris may accumulate upstream from drainage structures, causing a reduction in flow capacity of the waterway. Such debris can cause increased upstream flood depths and extremely swift velocities near the streambed. In extreme cases, drainage structures can be severely damaged or destroyed. Other destructive processes that commonly accompany rare floods are landsliding and mudflowage along steeply sloping terrain. These processes are often triggered by excessive wetting of the ground and by scour of stabilizing material from the base of slopes. Identification of areas where the above-described flood-related processes occur is beyond the scope of this report. Nonetheless, a detailed analysis of each process is an integral part of plans for extensive land development.

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MAP SHOWING AREA OF FRONT RANGE URBAN CORRIDOR

Base compiled by U.S. Geological Survey in 1972 from 1:24,000 quadrangles dated 1954-1966.
Limited revision from aerial photographs taken 1969

TRUE NORTH
MAGNETIC NORTH
12°
APPROXIMATE MEAN DECLINATION, 1975

SCALE 1:100 000

1 0 1 2 3 4 5 MILES
5000 0 5000 10 000 15 000 20 000 25 000 FEET
1 0 1 2 3 4 5 KILOMETRES

DATUM IS MEAN SEA LEVEL

EXPLANATION

Flood-prone area along principal stream based on study by U.S. Geological Survey

Flood-prone area along principal stream based on study by U.S. Army Corps of Engineers

Flood-prone area delineated on 7½-minute topographic quadrangle–width not shown because of small map scale

Flood-prone area not delineated on 7½-minute topographic quadrangle because of narrow canyon reach

MAP SHOWING FLOOD-PRONE AREAS, COLORADO SPRINGS–CASTLE ROCK AREA, FRONT RANGE URBAN CORRIDOR, COLORADO

By
Jerald F. McCain and W. R. Hotchkiss

1975

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