



**US Army Corps
of Engineers**
Waterways Experiment
Station

Wetlands Research Program Technical Report WRP-DE-4

A Hydrogeomorphic Classification for Wetlands

by Mark M. Brinson



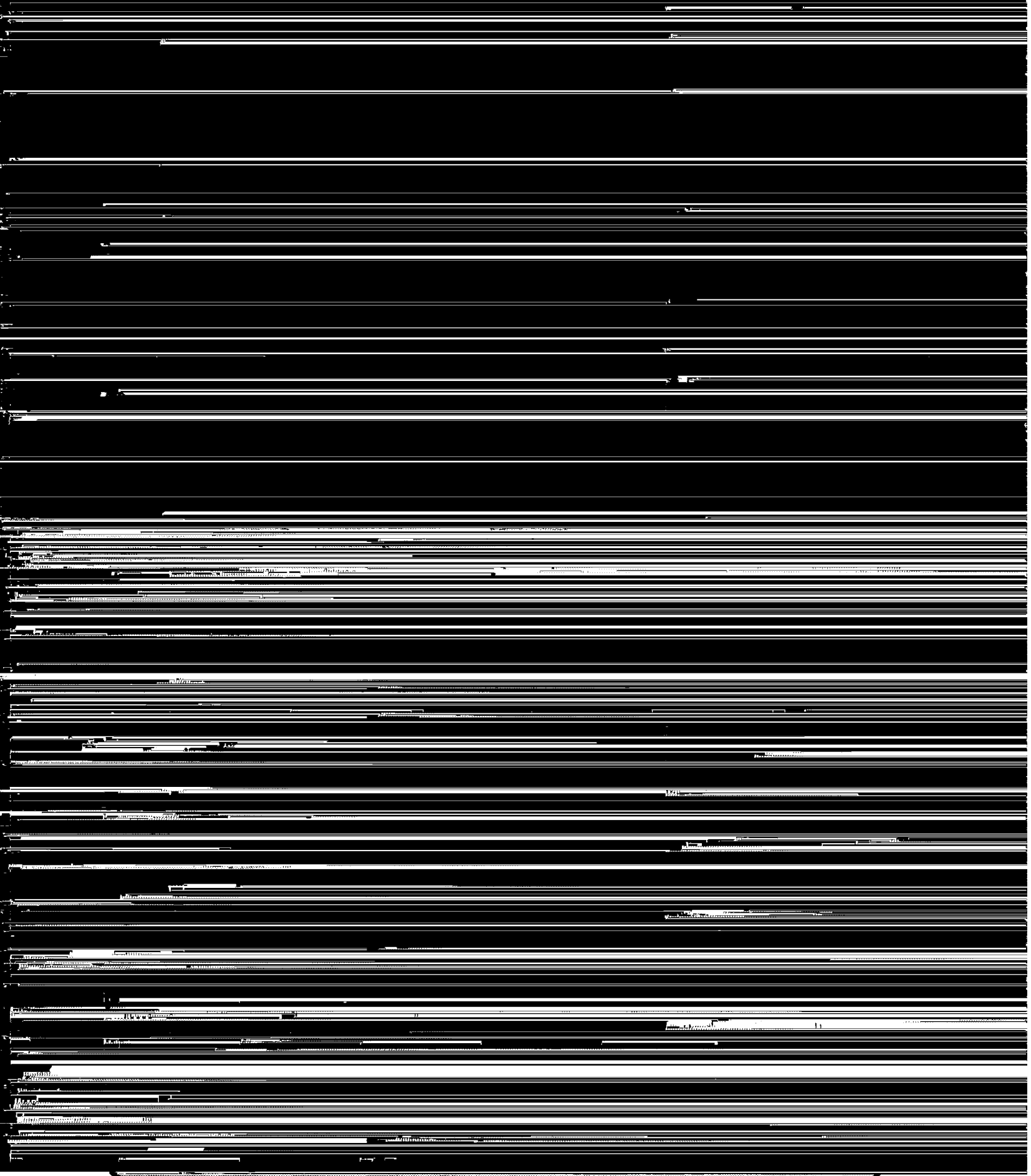
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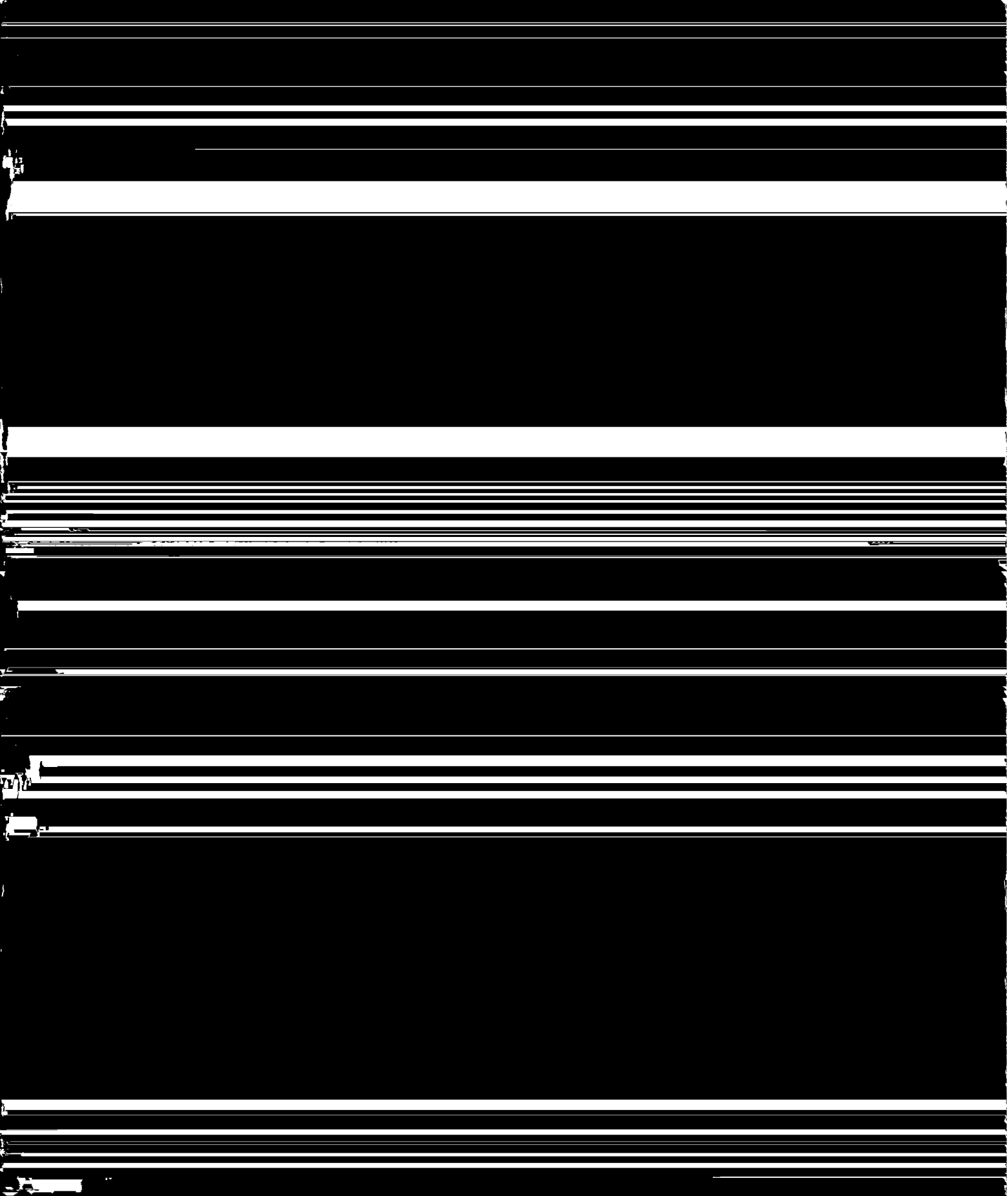


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for wetlands," Technical Report WRP-DE-4, U.S. Army
Engineer Waterways Experiment Station, Vicksburg, MS.

gra

pnic distribution of species. Species composition of plant communities,

How a much larger geographic area.

society and are normally part of the self-sustaining properties of an ecosystem. The relationship among these properties is illustrated in Figure 1.

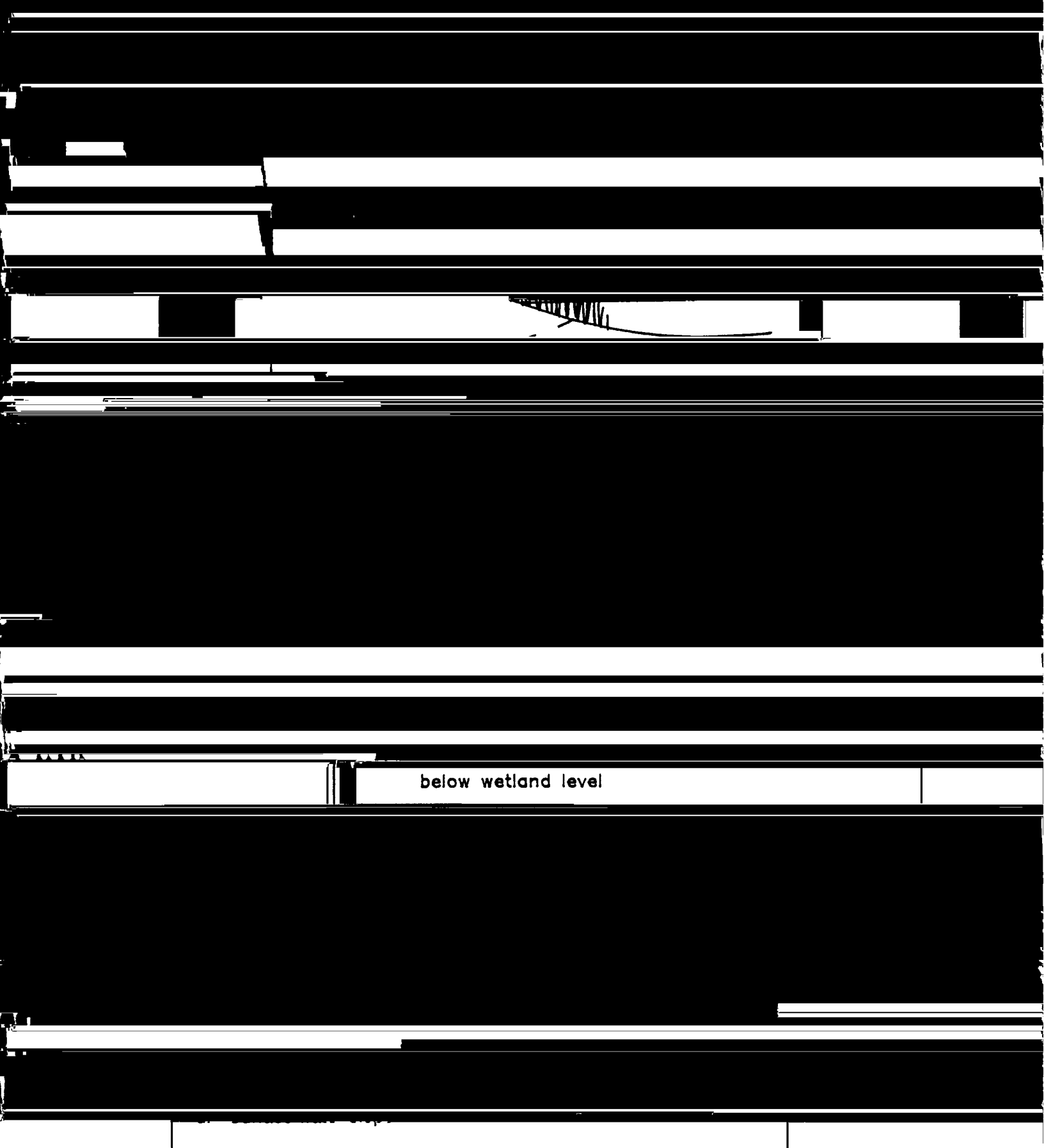
characteristics: discharge dominated, recharge dominated, and both recharge and discharge. Combinations of these types and situations are described as located within a surficial geologic setting. Hollands also provides a

and morphology of underlying mineral soil. The lowest level uses the physiognomy of the vegetation.

GROUNDWATER
INFLOW

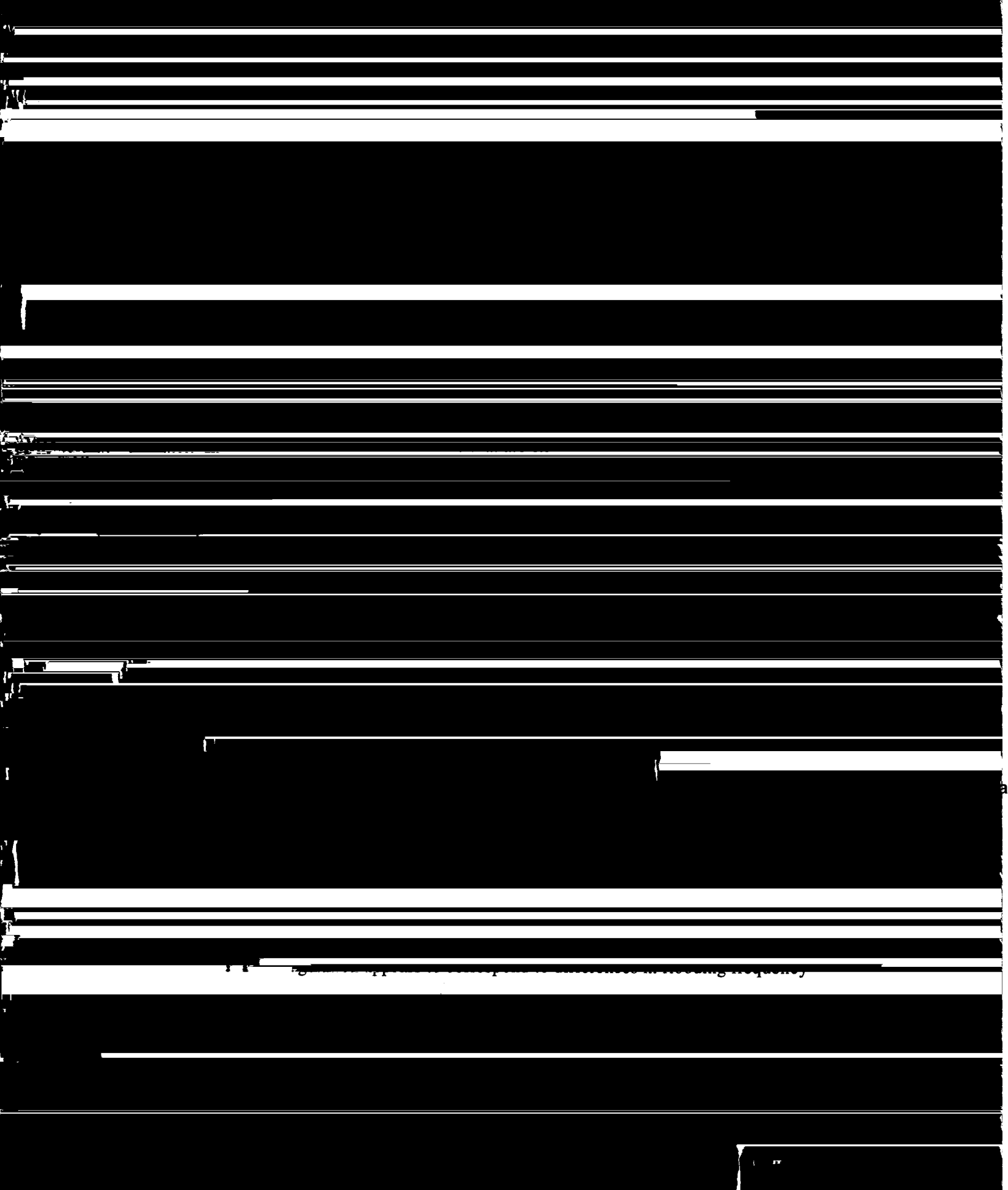
b. Groundwater depression

Figure 2. Four major hydrologic types of wetland types in Wisconsin
(Continued)



below wetland level

Figure 2. (Concluded)



1. The Government is committed to providing a high quality of service to its customers.

of little significance in the shallow waters typical of wetlands. However,

...need for improved communication among researchers and managers, and perhaps even with the public, by focusing on processes that are fundamental to the sustained existence of these ecosystems. The other need for

resulted by subsuming two of the five types for mangroves within other

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Figure 5. (Sheet 4 of 4)

could be added as a factor that controls vegetation structure and forest succession.

here as a separate category because of its strong relationship to
genic accretion and hydrology.

⁴ Normally requires records of discharge and stage height to indicate seasonal and interannual variation. Possible indicators may be used also.

⁵ Mechanisms for maintaining ecological significance.

⁶ Other ecologically significant functions may be present; only examples are given.

⁶ If wetland contains open water, waterfowl habitat may be inferred. For prairie pothole region, soil properties provide excellent indicators of hydrology (Hubbard 1988). Playa lakes of the southern High Plains reviewed by Bolen, Smith, and Schramm (1989).

⁷ Zedler (1987).

1001, 45...
Soil is saturated, saturated most of time. Graminoid species indicative of groundwater supply.

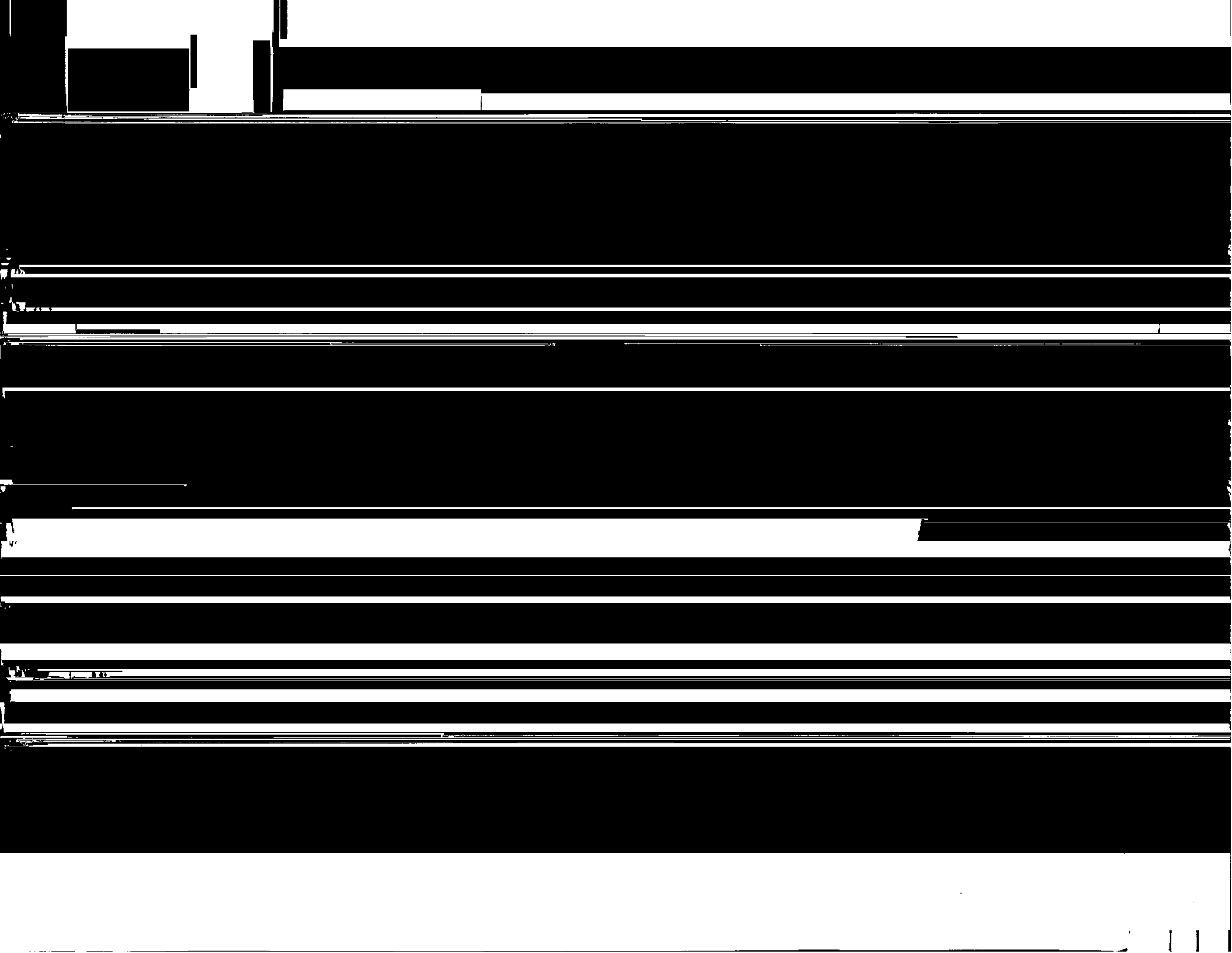
Soil color is brown, organic content and thickness. Minerotrophy evident from circumneutral pH and high-ion content.

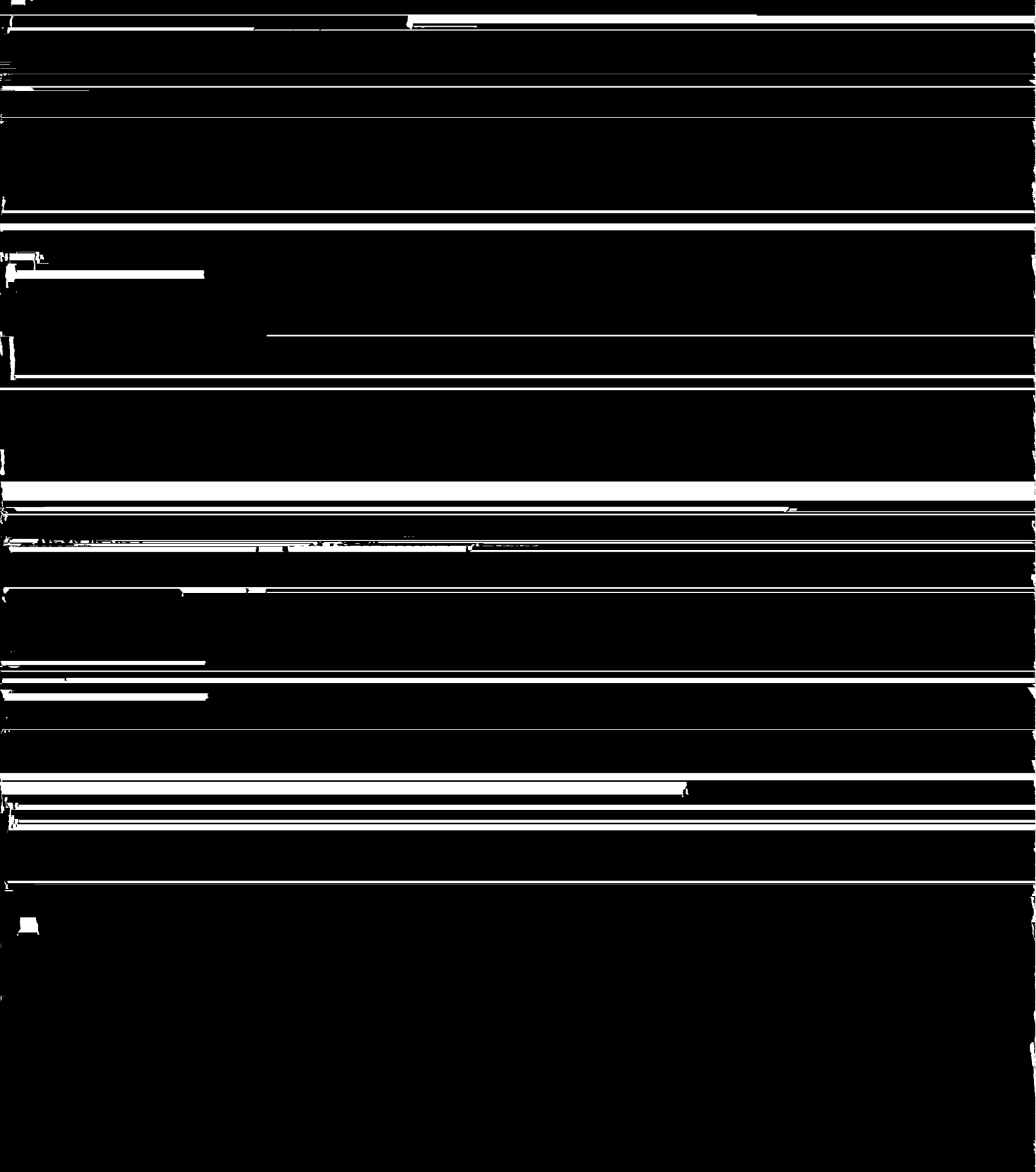
Subsurface water supply maintains saturation to surface and hydraulic gradient to maintain flow.

Represents channel for lateral water movement without channelized flow. Moderate levels of primary production and organic matter export.

TABLE 1. Summary of the results of the analysis of the data collected during the study.

Description





(Simson 1988, 1991). Thus, a given system may have characteristics of

piezometric surfaces could confirm or exclude this possibility.

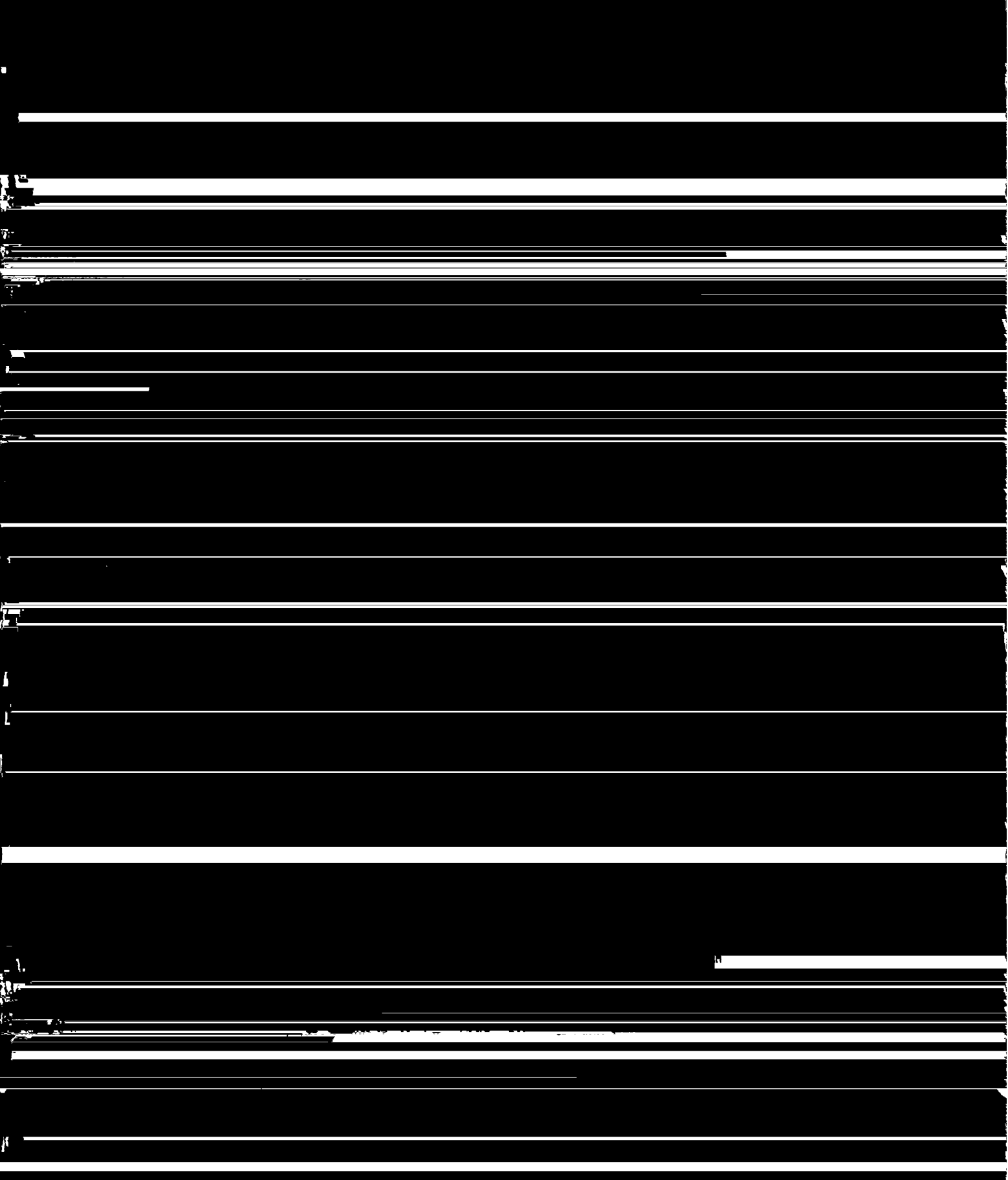
of water for wetlands. Adapted from Winter (1988)

Malvastrum, *Malvastrum* *peruvianum* (Engelm. 1861, 1868, Ravenel 1861).

floodplain wetlands are located. In high rainfall regions, woody debris and debris dams may be dominant structural channel and floodplain features

By press strands, stream swamps, and sloughs. In glaciated areas, the inherited landscape may continue to have major control on drainage patterns,

tively "immature" and drainage patterns have not had time to fully develop, the relationship between surface water and groundwater is often complex.



inflows are equal to outflows.

stream discharge exceeds channel capacity. Under natural conditions, lateral flows tend to be negligible in precipitation-driven wetlands except with major rainfall events when radial flow from the center may occur from raised peatlands.

~~_____ et al. (1987)~~

¹ Personal Communication, 1991, Frank Golet, University of Rhode Island, Kingston, RI.

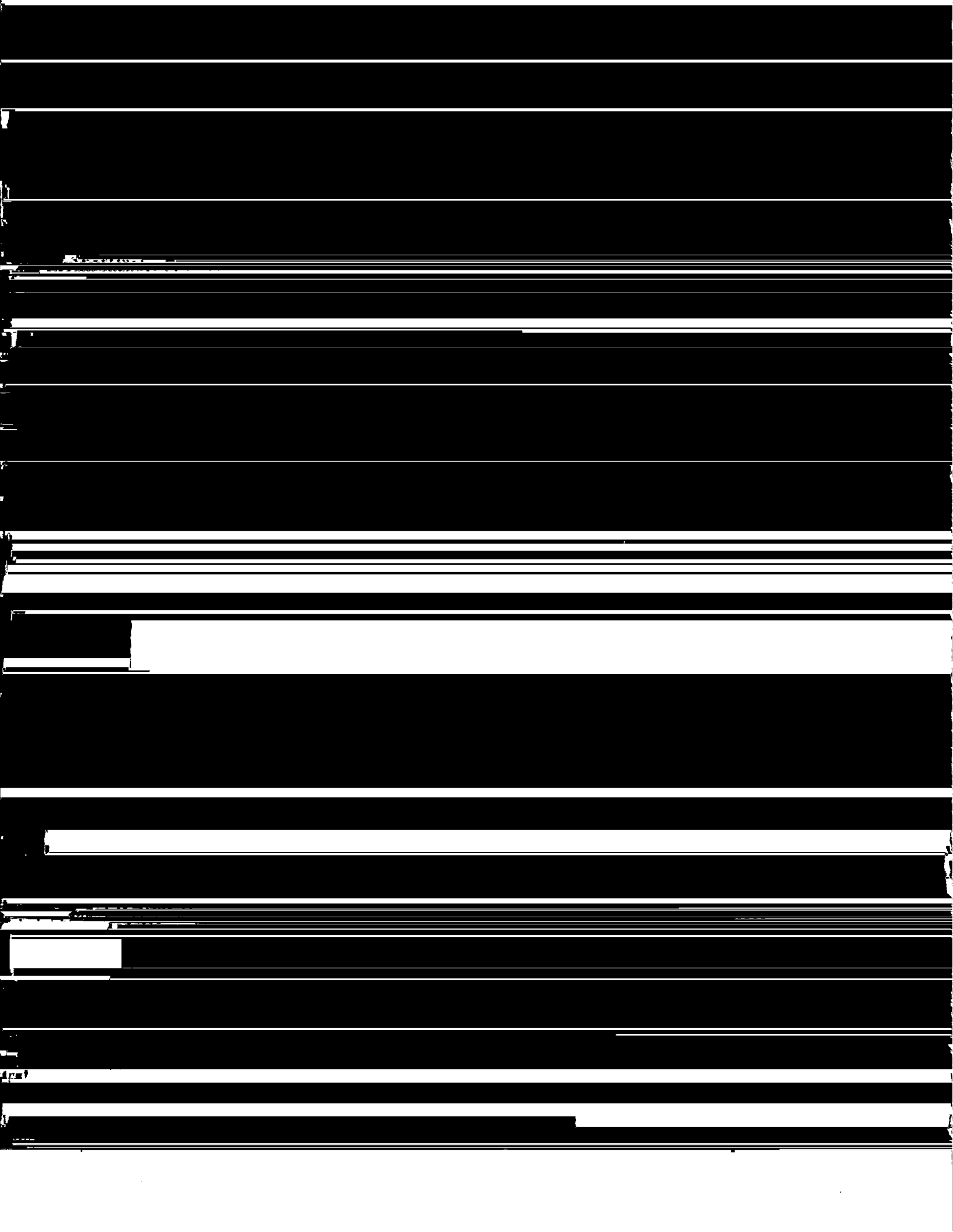
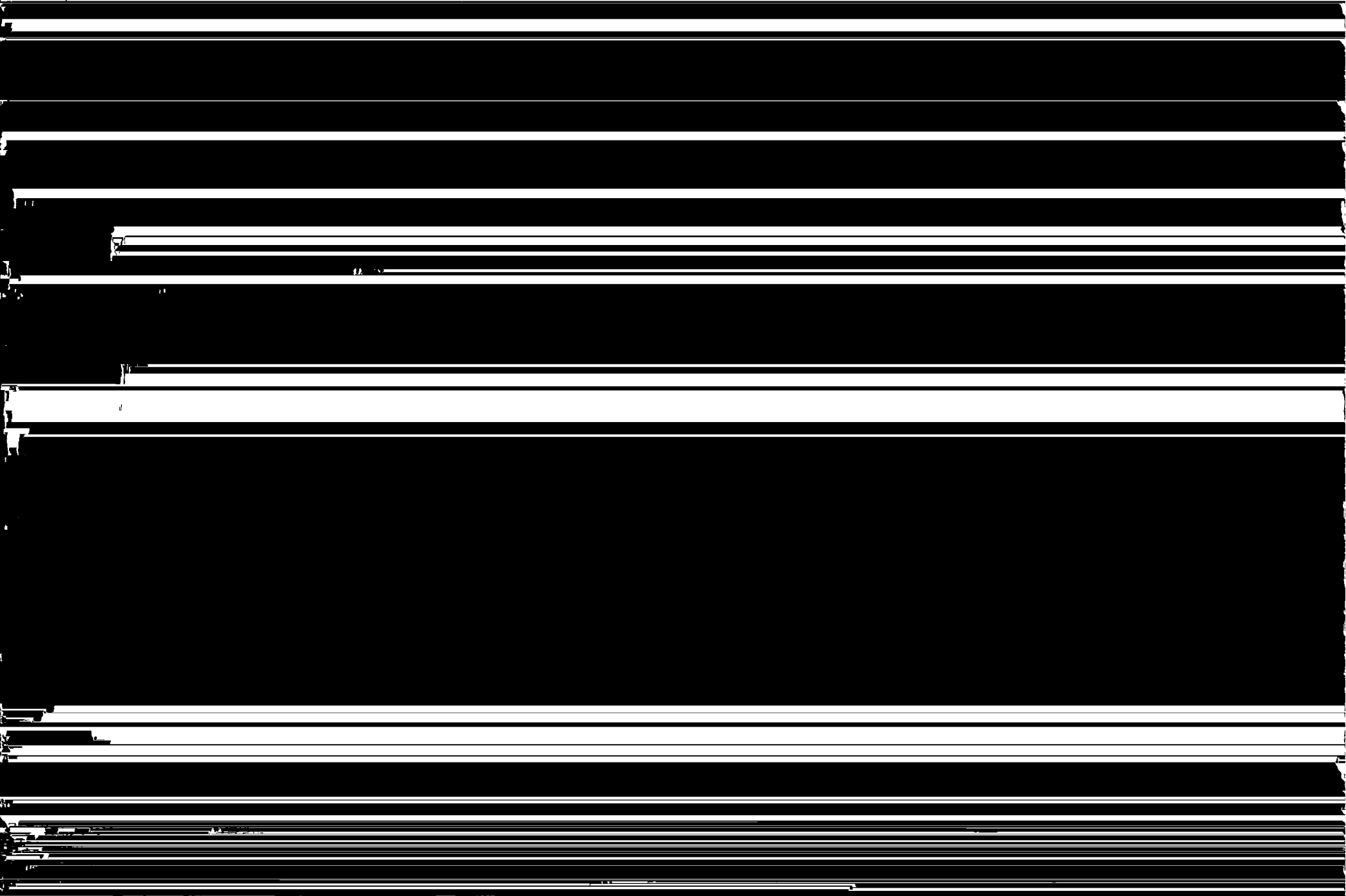


Table 17, with a cool, moist climate would have greater precipitation



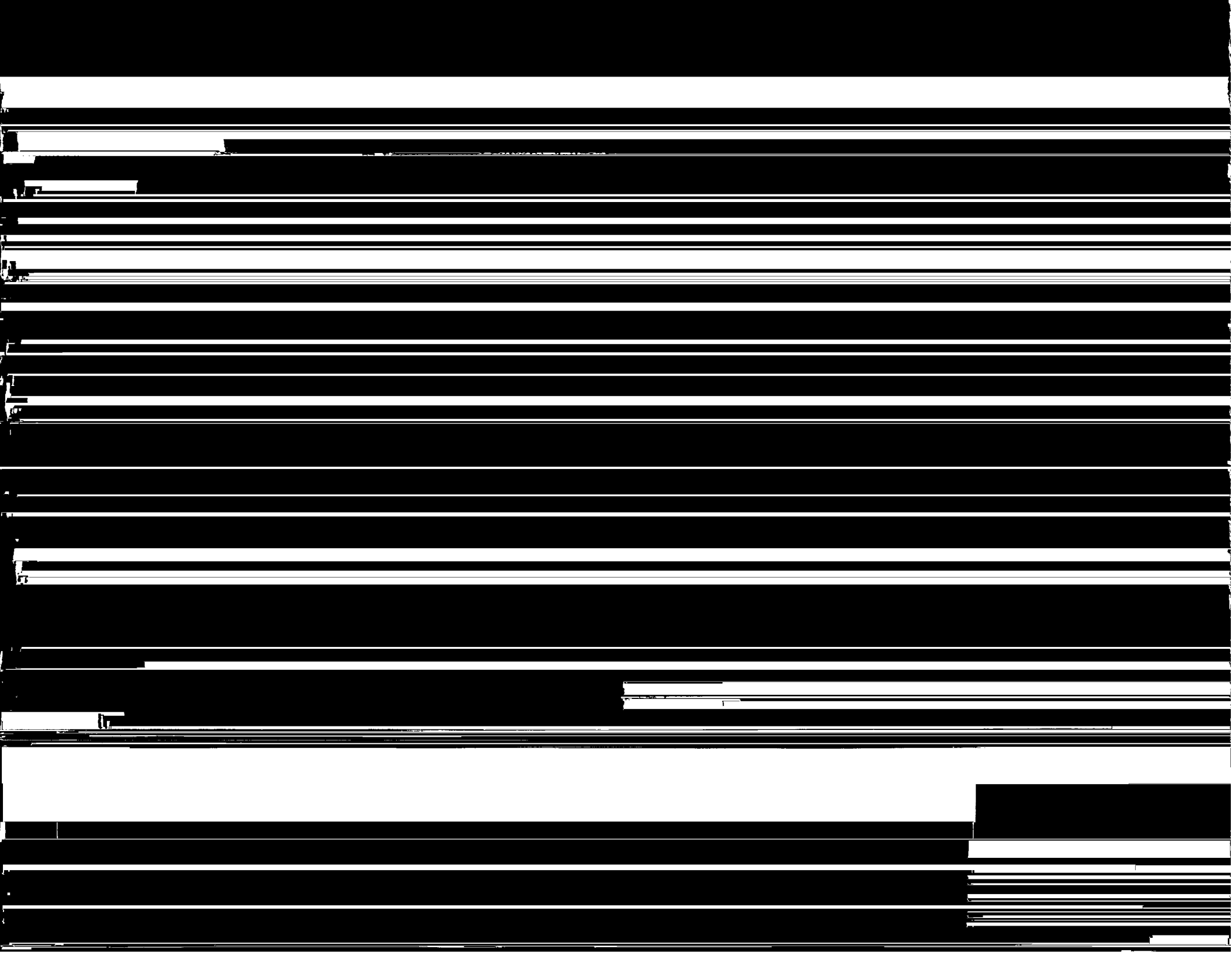
Many studies have shown that a water table depth of 1.5 m or less is likely required to initiate peat accumulation.

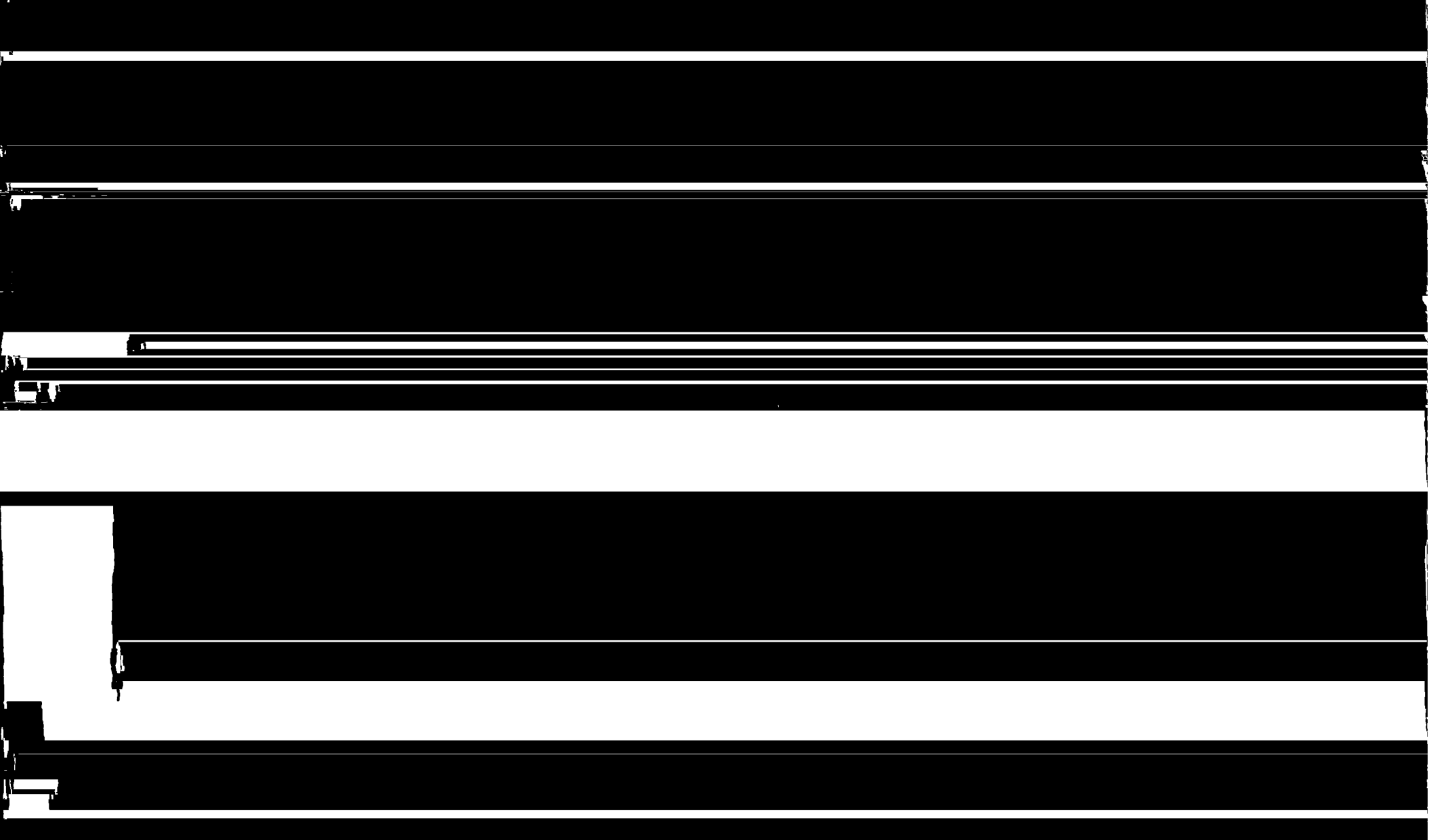
During the 1990s, the ratio decreased between groundwater and surface water sources and overbank flooding.

metabolic pathways (Inompson 1991).

land site. In and climates where drawdown can be extreme and prolonged,





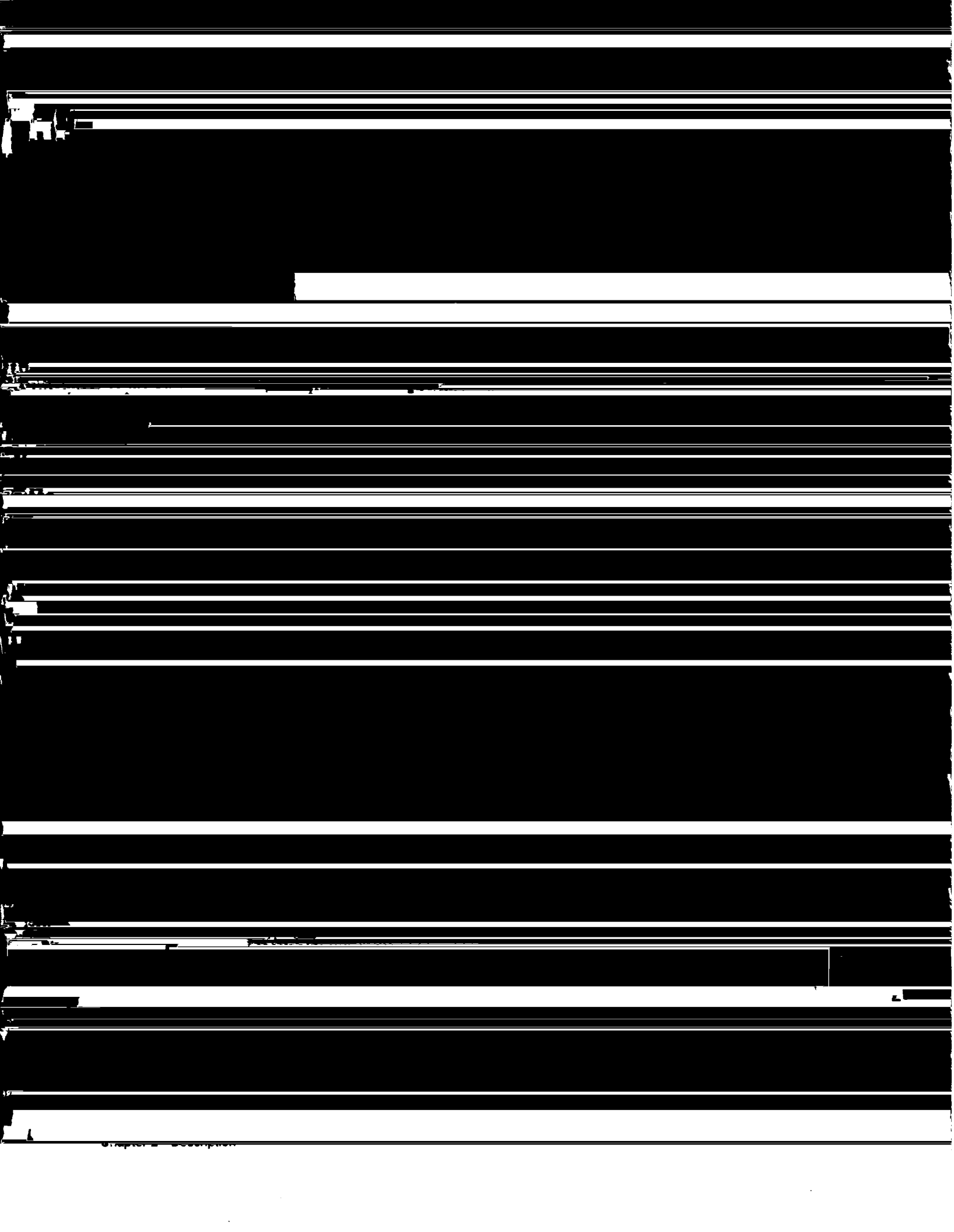


sr 2 Description

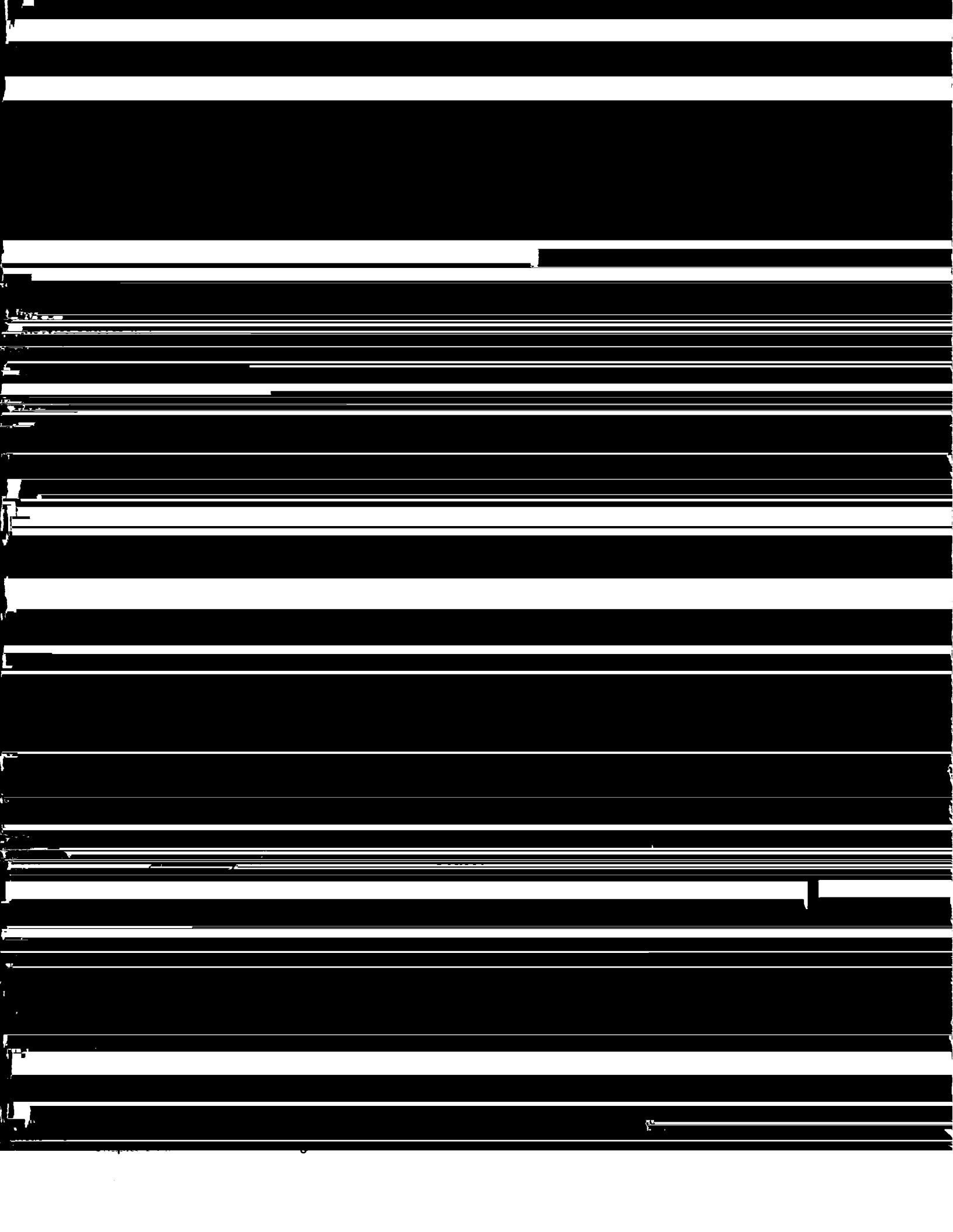


		extreme GW drawdown/drought).		
(Sheet 3 of 3)				

that wetlands undergoing erosion will have a very short life expectancy or have a very limited surface area. While the transport of water, nutrients,



Studies on freshwater fringe wetlands are not abundant (Prince and D'Itri 1985), especially in comparison with saltwater ones (Lugo 1990).



sectional profiles and direction of water flows. From Sloan
(1972)

² Groundwater derived from sandy soils that are not wetlands often have high concentrations of humic and fulvic compounds as indicated by water color.

of these factors and availability of plant nutrients commonly correspond

vide additional dimensions to the classification factor than previously and number of wetland types.

Other Indicators of Functioning

Indicators have been used in other classifications. For example, the Fish and Wildlife Service classification (Cowardin et al. 1979) uses several "modifiers" of water, pH, soil material, and salinity regimes. Their usefulness for resolving wetland types is due, in part, to the fact that they are a consequence of ecosystem processes and function. Indicators have

of the country, it is appropriate to depend upon the assignment of species as indicators of environmental conditions. Wetland indicator status of plants is an excellent example of this application (Tiner 1991).

wetlands being assessed in the future.

(Ogden and Weber 1982). Existing landscapes are vulnerable to changes in drainage because of strong coupling between landform and hydrology and to changes in climate because of climatic control of water balance.

alized by groundwater flow. Such water replenishment may maintain high redox levels relative to stagnant saturated soils, thus allowing the establishment of plant species that are not restricted to strongly reducing environments.

Environmental Protection Agency 404(b)(1) Guidelines (40 CFR Part 230), and several Memoranda of Agreement between the Corps and EPA.

depreciate natural resources such as forests and soils, but further treats their
damaged. Instead, the SNA ignores assets such as forests and soils, but further treats their
destruction as an increase in income rather than a loss of wealth (Solorzano et al. 1991).

reaching valid assessment conclusions. The use of reference networks as

¹ Personal Communication, 1991, Dennis Whigham, Plant Ecologist, Smithsonian

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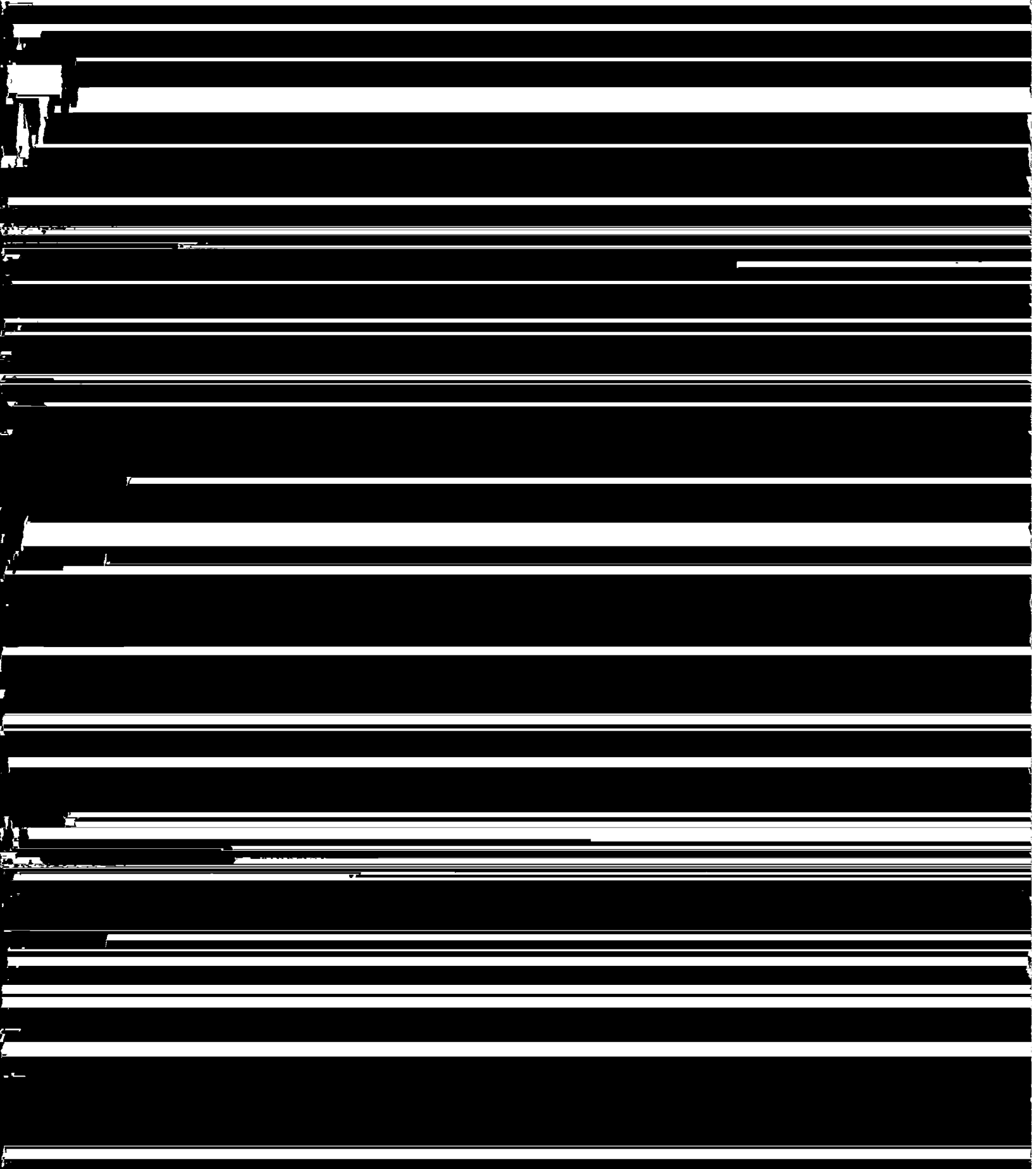
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Waterways Experimental Station, Vicksburg, MS.



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DC.

Ammonium is the inorganic form of nitrogen
ion form (NH_4^+). Ammonia (NH_3) is a gas.

References cited in this appendix are included in the references at the end of the appendix.

Bottomland—General term that refers to floodplain wetlands.

~~1. A channel that is subject to lateral migration of the channel bank is undergoing~~
erosion by lateral migration of the channel.

nels are poorly defined such that overbank flow is quickly exceeded with minor increases in discharge.

Flow, groundwater—Water that flows below the land surface through a porous medium normally under saturated conditions.

Hardness—A property of water that is roughly proportional to the ion concentration. Water from calcareous aquifers is often hard because of the calcium carbonate content. Such waters are very resistant to fluctuations in pH.

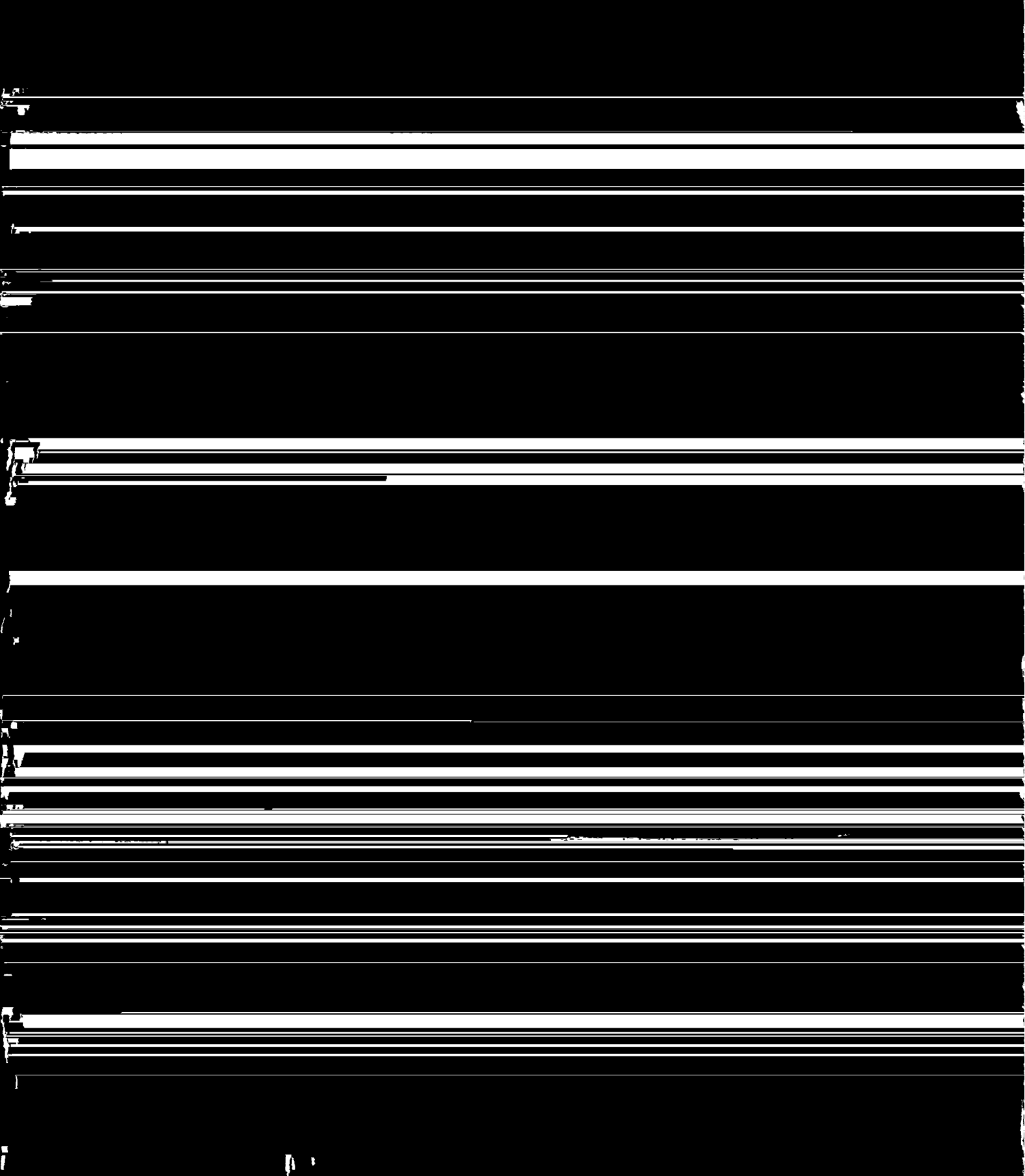
Inundation—The condition of water occurring above the surface, i.e., flooding.

east of the mountains.

Pipe flow—Flow of groundwater that results from secondary porosity (macropores) often formed by decayed root channels or animal burrows.

ponents.

Propagules—Reproductive structures, as the seeds or cuttings from plants.



Agility 10000 persons of salt marshes

marshes, and peatlands.

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Hydrodynamics
Hydrogeomorphics

Water source