DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
STATE OF NEW HAMPSHIRE
Governor's Energy Office and Department of Environmental Services
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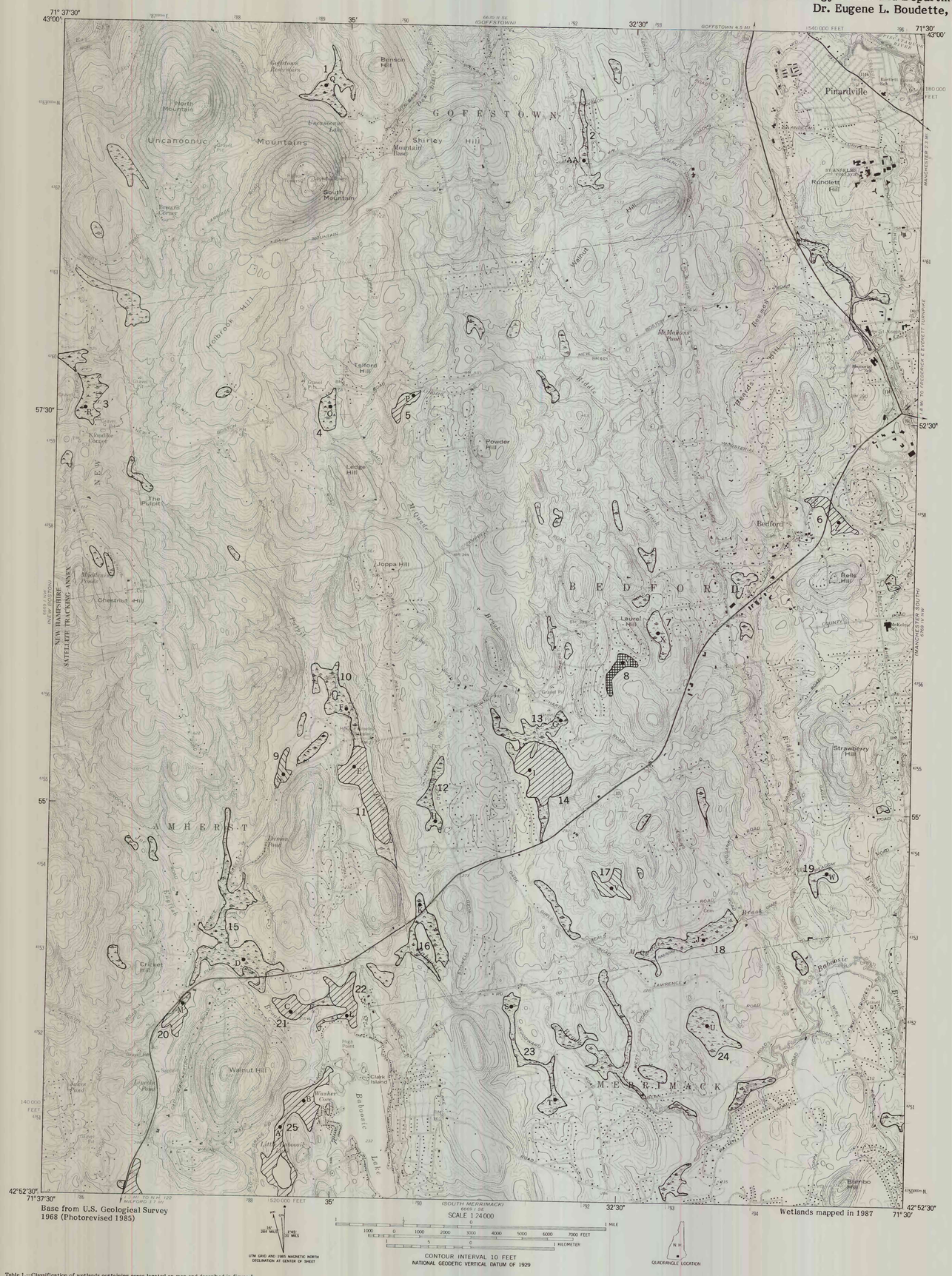
OPEN-FILE REPORT 89-294



EXPLANATION

Map Unit — Wetland Description

- Peat[1] absent or generally less than 5 ft thick
- Peat averages 5 ft thick
- Peat averages between 5 and 10 ft thick
- Peat averages more than 10 ft thick

[1]The American Society for Testing and Materials (1969) defines commercial peat as having an ash content of not more than 25 per cent dry weight.

8 — Wetland number classified in table 1

●K — Locality of core. See figure 1 for descriptions

PEAT RESOURCES, PEATLANDS AND WETLANDS

Concepts and Definitions

Peat:

Peat is a light- to dark-brown or black residuum formed by the partial decay and disintegration of plants that grew in marshes and swamps or in other damp places, such as raised bogs commonly known as heaths in New England. Peat may be (1) fibrous, matted material composed of mosses, ferns, grasses, rushes, reeds, sedges, and woody material from trees and shrubs; (2) finely divided plant material so decomposed that their biological identity is lost; or (3) nonfibrous, plastic, colloidal, and macerated material deposited at the bottom of lakes or other bodies of water.

Resources:

Commercial quality peat is defined by The American Society for Testing Materials (ASTM) as containing an ash content of not more than 25 percent on an air-dried basis. This peat should be at least 5 feet thick to be considered as a possible resource.

Because peat is derived from different types of vegetation and may contain varying amounts of mineral matter, the properties and composition of peat can vary considerably in different deposits and even in different parts of the same deposit. The principal factors that determine the commercial value of peat are: water-holding capacity, organic and ash content, fiber content, and acidity. The ASTM has published standard methods for testing each of these factors (ASTM-D-29) which may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia, PA 19103.

Peat is mined throughout the world chiefly for use in agriculture and horticulture, and to a lesser extent as a fuel. Its value for manufactured goods and for use as a filter is under current investigation.

Peatlands and Wetlands

Attention has recently focused on the value of in situ peat as an important factor in the environmental control of wastes from mines and factories and contamination from agricultural herbicides and insecticides. Peat not only soaks up elements like a sponge, but chemical processes and organisms within the peat and in the peat-forming environment bring about changes in organic and chemical wastes drained into the deposits. Marshes, swamps, and bogs containing peat deposits of varying thicknesses are collectively known as peatlands. They are also grouped under the more generalized term of "wetlands" by Cowardin and others (1979). Wetlands are described by these authors as lands where saturation with water is the dominant factor determining how soil is developed and what types of animal and plant communities live in the soil and on its surface. Wetlands are transitional between terrestrial and aquatic systems where the water table is usually at or near the surface; the land may be covered by shallow water at least seasonally. Wetlands may contain an organic-type soil so high in ash content that it is not considered peat.

Wetland/Peatland Classification Guide for New Hampshire

This guide is developed as an extension of the National Wetlands Classification System (Cowardin and others, 1979), which was designed by the U.S. Fish and Wildlife Service and is concerned primarily with wildlife habitats in which the wetland surface is of greatest importance. The three parameters of their classification is based are hydrophytic vegetation, hydric soil, and hydrology.

The extended classification used on this map adds the geologic parameters in a descriptive identification for both the wetland and its setting. The setting controls the stratigraphic development of the organic and inorganic material immediately below the wetland surface. The shape of the basin influences the thickness of both the organic and inorganic materials in the wetland. Type and structure of the surrounding consolidated and unconsolidated rock influence the ash and element content of the organic material beneath the wetland surface. Ground and surface water regimes also control ash and element content, as well as the stratigraphic development on which the amount of peat is predicted. Predictable chemical, bacterial, and physical processes are likewise basically controlled by shape and material of the rock basin and the ground and surface water regimes. The understanding of these processes, together with soil and vegetation controls, is vital to assessing the value of peatlands/wetlands for waste, herbicide, and pesticide control.

This extended classification system, like that of the Fish and Wildlife Service, is hierarchial. At the highest level "OTHER GEOLOGICAL ASPECTS" (see Table 1) have been added to their "HYDROPHIC VEGETATION," "HYDRIC SOIL," and "HYDROLOGY." Under each of these four major headings are appropriate modifiers and submodifiers (See example).

Example: Wetland 14, Core I

This wetland shown on the map and described in table 1 is located in Bedford Township along McQuade Brook. It has marsh and swamp types of hydrophitic vegetation under which is a peat deposit of commercial quality; ash content is less than 25 percent on the dry basis. This wetland is subject to overflow, which means that silt is added from time to time. The vegetation cover changes as swamp trees are drowned when the water table rises and are replaced by marsh grasses following the draining of the site. The pregiacial bedrock adjacent to the wetland is completely buried by glacial drift. Surficial geology is taken from Kotef (1979). The ZOm(z) bedrock symbol taken from Lyons and others (1986) stands for a quartzo-feldspathic and pelitic schist, gneiss, or granofel, calc-silicate beds or boudins, and quartzites in a migmatized pink granite complex. The organic material of the wetland is peat covered by a marsh and swamp with a relatively flat surface, meaning that the more acidic and nutrient-poor conditions that give rise to raised moss- and heath-covered bogs have not developed since last flooding.

Table 2 shows that wetland 14 cored at I covers 60 acres with an average of 5 ft of commercial-quality peat. This layer amounts to a resource of an estimated 60,000 tons of air-dried peat. Thickness is facilitated by the steep walls of the basin which is filling up. Absence of fine-grained material in the glacial drift and in the headwater stream flowing into the peat-forming environment increased peat quality by lowering ash content.

Tables 3 and 4 show analyses of three samples from core I, the stratigraphy of which is illustrated in figure 1. Ash content increases with depth, meaning the original pond filled first with mineral matter washed into open water. Later, as the basin filled with organic matter, ash content decreased; acidity decreases as shown with depth by an increase in pH. Sulfur content in consistantly low.

REFERENCES CITED

American Society for Testing Materials, 1969, D2607-69, Standard classification of peats, mosses, humus, and related products: 1916 Race St., Philadelphia, Pa. 19103, 1 p.

Cowardin, L.M., Carter, Virginia, Golet, F.C., and LaRoe, E.T., 1979, Classification of wetlands and deepwater habitats of the United States: U.S. Fish and Wildlife Service, p. 1-103.

Lyons, J.B., Bothner, W.A., Moench, R.H., and Thompson, J.B., 1986, Interim geologic map of New Hampshire: New Hampshire Department of Environmental Services Map OS-1-86, scale 1:250,000.

Kotef, Carl, 1970, Surficial geologic map of the Milford quadrangle, Hillsborough County, New Hampshire: U.S. Geological Survey Geologic Quadrangle Map GQ-881, scale 1:24,000.

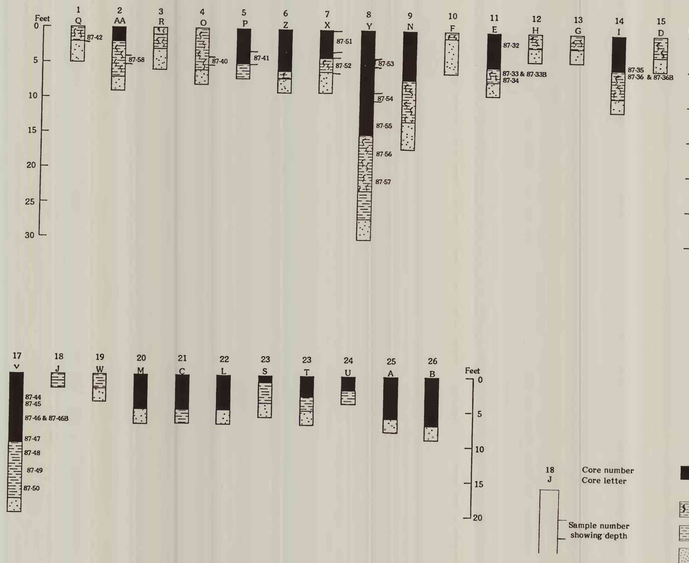


Figure 1.—Stratigraphy of cores in the South Merrimack 7.5-minute quadrangle showing depths of individual samples.

Table 1.—Classification of wetlands containing cores located on map and described in figure 1

Wetland Number	Core letter	I HYDROPHITIC VEGETATION				II HYDRIC SOIL upper 5 ft		III HYDROLOGY e.g. position of water table			IV OTHER GEOLOGICAL ASPECTS																
											A. Pregiacial bedrock adjacent to wetland						B. Glacial deposits adjacent to wetlands					C. Post-glacial deposits						D. Topography of wetland		
												1. Valley or basin wall slope				3. Structure		1. Slope			2. Texture		1. Deposits adjacent to wetland				2. Wetland deposits				
		A. Swamp	B.Marsh	C. Heath	D. Tidal Marsh	A. Peat with ash content (dry basis) less than 25%	B.Muck (ash content greater than 25%)	A. Subject to overflow including drowning by beaver or man	B. Not readily subject to overflow	C. Subject to pronounced water table shifts	a. Steep	b. Moderate	c. Gentle	d. Completely buried	2. Type (symbol from New Hampshire Gelogic Map)	a. Many fractures	b. Along a fault trace	a. Gentle	b. Moderate	c. Steep	a. Coarse, e.g. sand, gravel	b. Fine e.g. silt, clay	a. Stream	b. Dune	c. Tidal	d. Not applicable	a. Inorganic e.g sand, silt, clay	b. Organic (m) muck (p) peat	1. Flat e.g. marsh or swamp	2. Rounded with heath surrounded by moat	3. Forest floor appearing flat and comperitively dry
1	Q		X				X	X		X	X				Srl					X		X					(m)	X		
2	AA	X					X			X	X				Srl					X		X					(p)	X		
3	R	X	X				X			X				X	Dsl-6				X			X					(m)	X		
4	O		X				X	X		X					Dsl-6				X			X					(p)	X		
5	P	X				X			X		X				Srl					X		X					(m)	X		
6	Z		X			X		X						X	ZOm(z)					X	X	X	X				(p)	X		
7	X	X	X			X				X	X				P1m		X			X							(p)	X		
8	Y	X				X			X			X			P1m		X			X							(p)	X		
9	N			X		X					X				ZOm(z)					X							(p)	X		
10	F	X					X	X		X				X	ZOm(z)					X		X					(m)	X		
11	E	X	X			X				X	X				ZOm(z)		X			X		X					(p)	X		
12	H	X					X	X					X		ZOm(z)		X			X		X					(m)	X		
13	G	X	X				X	X		X				X	ZOm(z)		X			X	X					X	(p)	X		
14	I	X	X			X		X					X		ZOm(z)		X			X	X						(m)	X		
15	D	X	X				X	X		X				X	ZOm(z)					X	X	X					(m)	X		
16	K	X					X	X		X				X	ZOm(z)		X			X		X					(p)	X		
17	V	X				X			X		X				ZOm(z)					X							(m)	X		
18	J		X				X	X						X	ZOm(z)					X	X	X				X	(p)	X		
19	W		X				X			X				X	ZOm(z)					X	X	X					(m)	X		
20	M		X			X				X	X				ZOm(z)					X		X					(p)	X		
21	C	X	X			X				X				X	ZOm(z)					X							(m)	X		
22	L	X	X			X				X	X				ZOm(z)					X							(p)	X		
23	S&T	X					X		X		X				ZOm(z)					X		X					(p)	X		
24	U	X					X	X		X				X	ZOm(z)			X			X	X				X	(p)	X		
25	A&B	X	X			X			X		X				ZOm(z)				X				X				(p)	X		

Table 2.—*Estimated peat resources*

[Resources are estimated on the basis of a minimum thickness of 5 feet and a 1-acre-foot yield of 200 tons air-dried peat]

Wetland number	Core letter(s)	Acres	Average thickness (feet)	Air-dried weight (short tons)
5	P	15	5	15,000
6	Z	17	5	17,000
8	Y	15	12	36,000
9	N	10	7	14,000
11	E	65	5	65,000
14	I	60	5	60,000
17	V	23	10	46,000
20	M	20	5	20,000
21	C	18	5	18,000
22	L	33	5	33,000
25	A&B	60	5	60,000
				384,000

Table 3.—Proximate and ultimate analyses and moisture and sulfur content of core samples also analyzed for heating value (Btu)

			Dry basis											
			Proximate				Ultimate				Total Sulfur and Sulfur forms			
Wetland	Core	Sample	Btu Per lb.	Ash %	Volitile %	Fixed Carbon	Carbon %	Hydrogen %	Nitrogen %	Chlorine %	Pyritic	Sulfate	Organic	Total	Moisture as received %
11	E	87-33B	7613	28.17	51.99	19.84	42.92	4.61	2.10	0.02	0.19	0.37	0.91	1.97	91.54
14	I	87-36B	7503	30.13	48.76	21.11	42.47	4.62	2.21	0.02	0.01	0.14	0.45	0.60	90.53
17	V	87-46B	9720	5.28	57.69	37.03	58.51	4.97	1.28	0.02	0.01	0.04	0.31	0.36	91.23

Table 4.—*Ash, acidity, moisture, and sulfur content of core samples*

[See map for locations of wetlands and cores. See figure 1 for locations of samples in cores]

Wetland number	Core letter	Sample number	Ash (dry %)	Acidity (pH)	Moisture (as received %)	Sulfur (total)
2	AA	87-58	43.9	4.7	86.3	0.95
4	O	87-40	62.9	3.7	76.0	0.45
5	P	87-41	17.3	5.1	88.6	0.96
7	X	87-51	31.7	4.6	88.8	0.76
		87-52	63.3	4.4	84.1	0.68
8	Y	87-53	5.8	5.0	87.2	0.73
		87-54	5.7	5.9	87.9	0.90
		87-55	8.3	4.0	89.6	2.00
		87-56	40.3	3.2	87.7	2.60
		87-57	80.1	3.6	76.9	0.45
11	E	87-32	4.6	4.8	88.6	0.38
		87-33	33.8	3.9	91.6	1.50
		87-34	58.2	3.4	87.7	1.60
14	I	87-35	6.1	4.8	88.9	0.27
		87-36	32.8	4.6	91.5	0.57
17	V	87-44	8.2	5.2	88.4	0.80
		87-45	12.9	4.8	87.2	0.72
		87-46	8.0	5.4	91.3	0.43
		87-47	7.6	4.9	91.7	0.76
		87-48	52.7	5.0	88.7	0.71
		87-49	78.1	4.2	83.7	0.42
		87-50	75.4	3.9	81.1	0.73

WETLAND AND PEAT RESOURCE MAP OF THE PINARDVILLE 7.5-MINUTE QUADRANGLE, NEW HAMPSHIRE

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1989

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.