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100 Years of Changes in Ohio Peatlands^{1,2}

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ABSTRACT. Identified from field, herbarium, and literature surveys, 125 Ohio peatlands, that once covered 32,198 ha in 1900, were re-located and surveyed. In 1991, 2% of these peatlands continued to support typical peatland flora. Of the 98% that have been destroyed, conversion of peatlands to agricultural production (27,478 ha) was the major factor in causing peatland loss.

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INTRODUCTION

The passage of the Clean Water Act in 1977 brought into focus the loss of wetlands in the United States. An estimated 46 million ha of wetlands have been destroyed in the contiguous 48 states since the arrival of European settlers, with the highly agriculturalized Midwest accounting for nearly one-third of the loss (Dahl 1990). Ohio is estimated to have lost 90% of its wetlands, ranking second only to California's loss of 91%. Based on the amount of hydric soil, Ohio is thought to have had approximately 2,000,000 ha of wetlands prior to settlement; in 1990, slightly less than 200,000 ha remained (Dahl 1990). Drainage to accommodate agriculture has been the primary cause of wetland loss, although recreational uses, changes in water level, development, mining, logging, and fire have played important roles. Today, the majority of the remaining Ohio wetlands have been degraded and bear little semblance of their pre-settlement vegetative composition.

The two largest wetland systems that existed in Ohio in pre-settlement times were the Black Swamp region of northwestern Ohio and the marsh region along Lake Erie. The Black Swamp extended from the Indiana line to the western basin of Lake Erie. It originally contained 364,000 ha but has now been reduced to 5% of its original area (Herdendorf 1987). Approximately 10% of the original marshes remain along Lake Erie. The majority of the intact marshes are owned by private hunting clubs (Winous Point, Ottawa Hunt Club, for example) and public agencies (Ottawa National Wildlife Refuge, Crane Creek State Wildlife Area, among others) and are managed primarily for waterfowl.

In addition to marshes and swamps, peatlands in Ohio have been greatly impacted since the arrival of European settlers. Peatlands are characterized by soils made up of partially decomposed plant remains of either bryophyte, sedge, or graminoid origins. Peat growth is initiated by the presence and retention of water, and peat has the ability to hold water against drainage. Peatlands are further divided into different types of plant communities based primarily on water chemistry parameters (Andreas 1989, Andreas and Bryan 1990).

In 1912, Dachnowski published a comprehensive county-by-county treatment of Ohio's peatlands, including a map locating 206 peatlands in 45 of the 65 glaciated Ohio counties. His purpose was to estimate the extent and value of peatlands in Ohio with a view as to their fuel, commercial, and agricultural utilization. Dachnowski estimated that 74,000 ha, or about 0.5% of the land surface of Ohio, were in peatlands at the time of the arrival of European settlers. He field-tested 60,729 ha of peatlands and described in detail the floristics of 35,903 ha of peatlands. Other broad studies of Ohio peatlands include work by Stuckey and Denny (1981), who analyzed the flora of 20 Ohio fens (alkaline peatlands), and by Andreas (1985), who surveyed the location of 114 Ohio peatlands as related to geologic features.

The purposes of the present report are to assess the ecological condition of known Ohio sites that supported a typical peatland flora at the turn of the century, to determine the amount of peatland loss since 1900, and to identify the major factors causing this loss.

MATERIALS AND METHODS

From 1976-1991, field inventories were conducted in an effort to locate the areas discussed by Dachnowski (1912) that supported a peatland flora early in this century. The present study considers Dachnowski's sites as well as additional peatlands listed in Andreas (1985), and others reported to the authors since 1985. Each area visited was visually assessed to determine its ecological condition. Where the peatland no longer resembled its originally described condition, or where a peatland flora documented by herbarium records was no longer present, a determination was made as to the major cause of destruction. Literature surveys were conducted to locate pertinent information relating to the surveyed peatlands. The extent of the area covered by the peatlands was determined from literature sources, from locating the peatland on a topographic quadrangle map, and from visual field assessment.

RESULTS AND DISCUSSION

The name, location (county and township), approximate size, extant or historical area, major reason for loss, and selected references for each area located in the field were compiled (Table 1). Of the 125 localities studied, 54 no longer support the ecological condition described as

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²Revised from a paper presented at the Centennial [1991] Annual Meeting of The Ohio Academy of Science (Andreas and Knoop 1991).

TABLE 1

Summary of Ohio peatlands with location, approximate size, current status, reason for peatland loss, and selected references.

Peatland	County/Township	Size (ha)	Status ¹	Reason for Loss	References
1. Round Lake	Ashland/Lake	3	H	recreation	Dachnowski 1912 Emmitt 1981
2. Grand River Terraces*	Ashtabula/Morgan	12	E		herbarium records
3. Leon Bog	Ashtabula/Morgan	121	H	agriculture	Dachnowski 1912
4. Morgan Swamp*	Ashtabula/Morgan	323	E		Hicks 1933
5. Orwell Tamarack Bog	Ashtabula/Orwell	405	H	agriculture	Selby 1901 Dachnowski 1912 Hicks 1933
6. Pennline Bog	Ashtabula/Richmond	20	E		Hicks 1933 Herrick 1974
7. Pymatuning Creek	Ashtabula/Cherry Valley	40	E		herbarium records
8. Pymatuning Swamp	Ashtabula/Andover	202	H	water level changes	Dachnowski 1912 Hicks 1933
9. Cedar Bog*	Champaign/Urbana	12	E		Glotzhober et al. 1987 King and Frederick 1974
10. Urbana Raised Bog	Champaign/Urbana	2	E		Gordon 1933 Cusick and Troutman 1978 Stuckey and Denny 1981
11. County Line Bog	Champaign/Harrison	2	H	agriculture	Herrick 1974
12. Kiser Lake Fen*	Champaign/Harrison	2	E		Herrick 1974 Cusick and Troutman 1978 Neff and Vankat 1982
13. Brush Lake	Champaign/Rush	8	H	recreation	Schaffner et al. 1904 Dachnowski 1912 Herrick 1974
14. Baldwin Lane (Buck Creek) Fen	Clark/Moorefield	<1	E		Cusick and Troutman 1978 Stuckey and Denny 1981
15. Redmond Road Fen	Clark/Moorefield	1	E		Cusick and Troutman 1978
16. Medway Bog (Crystal Lake)	Clark/Bethel	162	H	mining, recreation	Dachnowski 1912
17. Prairie Road Fen*	Clark/Moorefield	5	E		Cusick and Troutman 1978 Stuckey and Denny 1981
18. Springfield Fen*	Clark/Moorefield	4	E		Knoop 1987
19. Guilford Bog	Columbiana/Center	81	H	water level changes	Dachnowski 1912
20. Watercress Marsh	Columbiana/Butler	5	E		Herrick 1974
21. New Washington Bog (Crawford Bog)	Crawford/Cranberry	810	H	agriculture	Anonymous 1881 Dachnowski 1912
22. New Haven	Crawford/Huron-Auburn	3,644	H	agriculture	Dachnowski 1912
23. Pettibone Swamp	Cuyahoga/Solon	2	H	development	herbarium records Andreas 1985

TABLE 1 (continued)

Peatland	County/Township	Size (ha)	Status ¹	Reason for Loss	References
24. Solon Bog	Cuyahoga/Solon	162	H	recreation	Dachnowski 1912 Aldrich 1943
25. Marl Bog	Darke/Harrison	4(?)	H	peat mining	Herrick 1974
26. Edgerton Bog	Defiance/Farmer	810	H	agriculture	Dachnowski 1912
27. Cranberry Marsh (Ayersville Bog)	Defiance/Highland	10	H	agriculture	Dachnowski 1912 Herrick 1974
28. Lehman Bog (Big Lake)	Defiance/Milford	40	H	agriculture	Selby 1901 Dachnowski 1912
29. Castalia Prairie*	Erie/Margaretta	40	E		Dachnowski 1912 Hurst 1971 Herrick 1974
30. Heffner Fen	Fairfield/Berne	40(?)	H	agriculture	Heffner 1939
31. Amanda Bog	Fairfield/Amanda	10(?)	H	agriculture	Dachnowski 1912 Williams 1962
32. Borton Bog	Fulton/Chesterfield	16	H	agriculture	Dachnowski 1912
33. Fern Lake/Lake Kelso*	Geauga/Burton	19	E		Dachnowski 1912 Andreas and Bryan 1990
34. Koelicker Fen*	Geauga/Munson	5	E		herbarium records
35. Punderson Lake*	Geauga/Newberry	10	E		herbarium records
36. Rider Road Bog	Geauga/Burton	2	E		herbarium records
37. Bender Fen	Geauga/Burton	2	E		herbarium records
38. Snow Lake	Geauga/Troy	23	E		Dachnowski 1912
39. Pekin Road Fen	Geauga/Newberry	8	E		herbarium records
40. Doorley Fen	Greene/Bath	1	E		herbarium records
41. Pearl's Fen	Greene/Bath	<1	E		herbarium records
42. Simms Bog	Greene/Bath	405	H	agriculture	Dachnowski 1912
43. Zimmerman Fen*	Greene/Beavercreek	1	E		Stuckey and Denny 1981
44. Spring Valley Marsh*	Greene/Warren Spring Valley	100	E		Dachnowski 1912 Herrick 1974
45. Beaver Creek Wetlands*	Greene/Beavercreek	40	E		Schmalhofer et al. 1992
46. Hog Creek Marsh	Hardin/Washington	8,000	H	agriculture	Dachnowski 1912
47. Bonnet Lake (Long Lake)	Holmes/Washington	41	H	water level changes	Dachnowski 1912 Wilson 1972
48. Kick Fen	Holmes/Washington	8	E		Cusick and Troutman 1978 Wilson 1972 Stuckey and Denny 1981
49. Washington Fen (Winterberry Bog)	Holmes/Washington	6	E		Herrick 1974

TABLE 1 (continued)

Peatland	County/Township	Size (ha)	Status ¹	Reason for Loss	References
50. Bloody Run Swamp	Licking/Harrison	162	H	agriculture	Dachnowski 1912 Detmers 1912 Heffner 1939
51. Cranberry Island*	Licking/Licking	5	E		Dachnowski 1912
52. Buckeye Lake	Licking/Licking	1,620	H	water level changes	Dachnowski 1912 Detmers 1912
53. Utica Bog	Licking/Washington	8	H	logging development	Dachnowski 1912 Herrick 1974
54. Torrens Bog	Licking/Burlington	3	H	agriculture	Herrick 1974
55. Black Lake	Logan/Miami	50	H	agriculture	Herrick 1974
56. Dokes Lake	Logan/Union	1	H	agriculture	Cusick and Troutman 1978
57. Liberty Fen*	Logan/Liberty	<1	E		Stuckey and Denny 1981
58. McCracken Bog	Logan/Liberty	4	E		Herrick 1974
59. Mickey Fen	Logan/Union	3	E		Stuckey and Denny 1981
60. Stocker Farm Fen	Logan/Liberty	1	E		herbarium records
61. Camden Lake Bog*	Lorain/Camden	10	H	agriculture, water level changes	Mossman 1972 Lauschman 1991
62. Irwin Prairie*	Lucas/Spencer	81	E		Herrick 1974 Cusick and Troutman 1978
63. Kitty Todd Prairie*	Lucas/Spencer	8	E		Herrick 1974
64. Garfield Bog	Mahoning/Goshen	81	H	agriculture	Dachnowski 1912
65. Snyder Bog	Mahoning/Beaver	202	H	water level changes	Dachnowski 1912
66. Seville Bog	Medina/Guilford	810	H	agriculture	Dachnowski 1912
67. Silver Lake Fen	Miami/Bethel	16	E		Stuckey and Denny 1981
68. Kibler Bog	Pickaway/Circleville	4	H	agriculture	Herrick 1974
69. Asbury Fen	Portage/Hiram	3	E		Andreas 1980
70. Atwater Center	Portage/Atwater	162	H	agriculture	Dachnowski 1912
71. Barnacle Bog*	Portage/Ravenna	4	E		herbarium records
72. Bird Farm Bog	Portage/Rootstown	10	E		Herrick 1974 Andreas 1980
73. Burned Bog	Portage/Hiram	4	H	agriculture	herbarium records
74. Eckert Bog	Portage/Ravenna	12	H	water level changes	Dachnowski 1912 Andreas 1980
75. Flatiron Lake Bog*	Portage/Suffield	12	E		Andreas and Bryan 1990
76. Herrick Fen*	Portage/Streetsboro	20	E		Herrick 1974 Andreas 1980 Stuckey and Denny 1981

TABLE 1 (continued)

Peatland	County/Township	Size (ha)	Status ¹	Reason for Loss	References
77. Gott Fen*	Portage/Streetsboro	6	E		Stewart 1987
78. Infirmary Road Bog	Portage/Mantua	<1	H	succession	herbarium records Andreas 1985
79. Kent Bog*	Portage/Brimfield	17	E		Andreas 1980
80. Mantua Bog*	Portage/Mantua	8	E		Herrick 1974 Andreas 1980 Stuckey and Denny 1981
81. Mishler Road Fen	Portage/Suffield	<1	H	development	herbarium records Andreas 1985
82. Rockwell Bog	Portage/Franklin	27	E		herbarium records
83. Stratton Pond	Portage/Franklin	9	E		herbarium records
84. Streetsboro Bog	Portage/Streetsboro	20	E		Herrick 1974 Andreas 1980 Stuckey and Denny 1981
85. Triangle Lake Bog*	Portage/Rootstown	5	E		Herrick 1974 Andreas and Bryan 1990
86. Beck Fen*	Portage/Streetsboro	4	E		herbarium records
87. Way Fen	Portage/Shalersville	4	E		Andreas 1980
88. Forquier Bog	Richland/Cass	2	E		herbarium records Andreas 1985
89. Betsch Fen*	Ross/Green	6	E		Herrick 1974 Stuckey and Denny 1981
90. Spring Bank Fen	Ross/Union	<1	E		herbarium records
91. Springville Marsh*	Seneca/Big Springs	50	E		herbarium records
92. Big Spring Marsh	Seneca/Big Springs Hancock/Wyandot	1,800	H	agriculture	Bonser 1903 Dachnowski 1912
93. Brewster Bog	Stark/Sugar Creek	53	E		Herrick 1974 Andreas 1980
94. Baughman Bog	Stark/Sugar Creek	3	E		herbarium records
95. Canton Bog	Stark/Canton	526	H	filled, development	Selby 1901 Dachnowski 1912 Andreas 1980
96. Congress Lake	Stark/Lake	36	H	development	Selby 1901 Andreas 1980
97. Hartville Bog	Stark/Lake	12	E		Herrick 1974 Andreas 1985
98. Jackson Fen*	Stark/Jackson	5	E		Herrick 1974 Andreas 1980 Stuckey and Denny 1981
99. Lake Township Bog	Stark/Lake	4	H	agriculture	herbarium records
100. Lyman Bog	Stark/Sugar Creek	<1	E		herbarium records

TABLE 1 (continued)

Peatland	County/Township	Size (ha)	Status ¹	Reason for Loss	References
101. Myers Lake	Stark/Canton	80	H	recreation, development	Selby 1901 Potter 1947 Andreas 1980
102. Stark-Case Prairie	Stark/Perry	3	E		Cusick and Troutman 1978 Andreas 1980
103. Caston Pond Bog	Summit/Green	9	E		Herrick 1974
104. Copley Bog	Summit/Copley	1,012	H	agriculture	Riddell 1836 Selby 1901 Dachnowski 1912 Andreas 1980
105. Karlo Bog	Summit/Coventry	4	E		herbarium records
106. Luna Lake Bog	Summit/Franklin	8	H	development	Potter 1947
107. Mud Lake Bog	Summit/Hudson	810	H	agriculture, development	Dachnowski 1912
108. Myersville Fen	Summit/Green	4	E		Herrick 1974 Andreas 1980 Stuckey and Denny 1981
109. Nimisila Fen*	Summit/Green	<1	E		Herrick 1974 Andreas 1980 Stuckey and Denny 1981
110. Norton Bog	Summit/Norton	6	E		Andreas 1980
111. Railroad Bog	Summit/Twinsburg	1	E		Andreas 1980
112. Steinert's Bog	Summit/Bath	2	E		herbarium records
113. Singer Lake	Summit/Green	111	E		Herrick 1974 Andreas 1980
114. Twinsburg	Summit/Twinsburg	2	E		Herrick 1974 Andreas 1980
115. Turkeyfoot Lake Bog	Summit/Franklin	10	H	development	Selby 1901 Dachnowski 1912 Andreas 1980
116. Bloomfield Bog	Trumbull/Bloomfield	810	H	agriculture, fire	Selby 1901 Dachnowski 1912
117. West Swamp	Trumbull/Braceville	2	H	agriculture	herbarium records
118. Tully Bog	Van Wert/Tully	7,287	H	agriculture	Dachnowski 1912
119. Brown's Lake Bog*	Wayne/Clinton	55	E		Herrick 1974 Andreas 1980
120. Fox Lake Bog	Wayne/Baughman	194	H	mining	Selby 1901 Dachnowski 1912 Andreas 1980
121. Orville Bog	Wayne/Baughman	41	H	agriculture	Dachnowski 1912 Potter 1947
122. Mud Lake*	Williams/Northeast	20	E		Herrick 1974 Brodberg 1976 Stuckey and Denny 1981

TABLE 1 (continued)

Peatland	County/Township	Size (ha)	Status ¹	Reason for Loss	References
123. Nettle Lake	Williams/Northeast	38	H	development	Herrick 1974
124. St. Joseph Bog	Williams/St. Joseph	41(?)	H	agriculture, fire	Selby 1901 Dachnowski 1912
125. Crane Bog	Wyandot/Crane	81	H	agriculture, fire	Dachnowski 1912

^{*}Signifies an area protected by organizations such as the Division of Natural Areas and Preserves (ODNR), The Nature Conservancy, county park, museum, or other protective organization.

¹"H" signifies an historical area, "E" signifies an extant area.

occurring at the turn of the century. Because hydrology and organic soil substrates are present, these localities meet the federal criteria for wetlands (Federal Interagency Committee for Wetland Delineation 1989). Many still support hydrophytic vegetation (Reed 1988), and a few have remnants of a peatland flora in isolated hummocks or small "islands." An example of this condition is Camden Lake Bog (Lorain County). The peatland mat was modified by the draining of the lake and ditching so that much of the original vegetation was severely impacted (Mossman 1972). Lauschman (1991) reported that native taxa are beginning to recolonize the area and that there has been a return of some of the original bog flora.

In some situations the peatland has been greatly modified, but large tracts (several hectares) of a peatland plant community remain. For example, Cranberry Island State Nature Preserve (Licking County) is a remnant of the once extensive Buckeye Lake peatland complex which was destroyed with the construction of part of the Ohio canal system (Detmers 1912). Springville Marsh State Nature Preserve (Seneca County) is a 75 ha remnant of the once extensive 1,800 ha Big Spring Prairie which was destroyed by farming.

Losses From Agriculture

As determined by the study, 27,478 ha of peatlands have been destroyed by agriculture (Table 1). We found that most of the western and central Ohio peatlands cleared for cultivation remain actively farmed, whereas those in northeastern Ohio have been abandoned and have revegetated as a shrub thicket, or as a *Acer rubrum* L. (red maple) – *Ulmus americana* L. (American elm) forest.

New Washington Bog (Crawford County), originally supported an area where *Vaccinium macrocarpon* Aiton (cranberry) covered about 800 ha (Dachnowski 1912). The cranberries were harvested by the native Americans and the first settlers, and sold for as much as three to four dollars a bushel (Anonymous 1881). New Washington Bog was drained, and much of it eventually burned, so that today all that remains are open cultivated fields.

Mud Lake Bog (Summit County) occupied

approximately 810 ha and was described as being dominated by *Larix laricina* (DuRoi) K. Koch (tamarack) (Dachnowski 1912). Ditched in the early 1930s and converted to agriculture, a few small wet areas still contain *Sphagnum* hummocks around the bases of *Vaccinium corymbosum* L. (northern high-bush blueberry), but the majority of the area is vegetated with a thicket of *Phalaris arundinacea* L. (reed canary grass), *Viburnum recognitum* Fern. (northern arrow-wood), *Acer rubrum* L. (red maple), *Cephalanthus occidentalis* L. (buttonbush), *Rosa palustris* Marsh. (swamp rose), *Salix nigra* Marsh. (black willow), and *Rhamnus frangula* L. (European buckthorn).

Big Spring Prairie (Seneca and Hancock counties) was modified beginning in 1860 when a vast network of ditches was established throughout the wetland. Ditching continued over the next 40 years, and by 1901 virtually the entire wetland was brought under agricultural production (Bonser 1903).

According to Dachnowski (1912) as the peatlands were cleared and drained for agriculture, the peat deposits frequently and repeatedly caught on fire. At Big Spring Prairie (Springville Marsh State Nature Preserve), sparks from the adjacent railroad ignited the dry peat and one such fire was documented as having burned for over a year (Bonser 1903). In some cases, such as Ayersville Bog (Defiance County), little of the organic soil remains as a result of fire and wind erosion from agricultural practices.

Losses From Recreation

An estimated 291 ha of peatlands have been lost as lakes were developed for recreation, primarily vacation cottages and camps. An example of this is Myers Lake (Stark County), a 57 ha glacial kettle lake. At the time of the arrival of European settlers, native Americans lived on the margin of the lake. Originally called Wells Lake, Myers Lake was purchased by Andrew Myer in 1810 (Heald 1963). In the middle 1800s it became a resort area and eventually included an amusement park (Blue 1928). Herbarium records collected between 1890 and 1936 indicate that *Eriophorum virginicum* L. (tawny cotton grass), *Cypripedium acaule* Aiton (pink

lady'slipper), *Gaultheria hispidula* (L.) Bigelow (creeping snowberry), *Cornus canadensis* L. (bunchberry), *Larix laricina* (DuRoi) K. Koch (tamarack), *Andromeda glaucophylla* Link (bog rosemary), *Rhus vernix* L. (poison sumac), *Salix candida* Fluegge (hoary willow), *Salix petiolaris* J. E. Smith (slender willow), and *Sarracenia purpurea* L. (pitcher plant) grew on the *Sphagnum* mat (Andreas 1980). Two species, *Gaultheria hispidula* and *Andromeda glaucophylla*, are now presumed extirpated from Ohio (Division of Natural Areas and Preserves 1990). By 1992 Myers Lake was surrounded by houses, with a marina along the southern shore.

Losses From Changes in Water Level

At least 2,229 ha of peatlands have been lost because of changes in water level such as dam construction for the creation of reservoirs, or the changing of water flow to accommodate the canal system. The building of the Ohio canal system affected peatlands at Lake St. Mary's (Auglaize County), Buckeye Lake (Licking County), and Summit Lake (Summit County). These areas were all heavily impacted prior to Dachnowski's 1912 survey.

Dachnowski discussed two tamarack bogs, Eckert Bog and Brimfield Bog (Portage County), which now lie under reservoirs built by the city of Akron. The 203 ha Snyder Bog (Mahoning County) is now a recreational lake called Pine Lake. Kiser Lake Fen (Champaign County) has been reduced in size after the building of a dam on Mosquito Creek (Neff and Vankat 1982).

Losses From Mining, Development, and Miscellaneous Causes

Peatland communities primarily destroyed by housing developments, deposition of fill, logging, mining, and natural succession total nearly 952 ha. Canton Bog (Stark County) once supported peatland taxa such as *Carex diandra* Schrank (lesser panicked sedge), *Chamaedaphne calyculata* (L.) Moench (leatherleaf), *Drosera rotundifolia* L. (round leaved sundew), *Eriophorum viridi-carinatum* (Engelm.) Fern. (green cotton-grass), *Salix pedicellaris* Pursh (bog willow), *Trollius laxus* Salisb. (globeflower), and *Valeriana uliginosa* (T. and G.) Rydb. (swamp valerian) (Andreas 1980). *Trollius laxus* is a very rare Ohio plant, and *Valeriana uliginosa* is presumed extirpated from Ohio's flora (Division of Natural Areas and Preserves 1990). Canton Bog has been covered by a landfill and county fairgrounds.

According to Hurst (1971), Castalia Prairie, a formerly 1,400 ha wetland of wet prairie and open fen community, began to be impacted as early as 1810 with the construction of several dams built to modify major spring seeps for the operation of a mill race and a grist mill. The most significant impact in the final obliteration of this system began in 1897 with the mining of the area's marl deposits for the making of cement. This use continued until 1957 and approximately one-half of the site was mined. Much of the unmined area was ditched for the establishment of truck farming. In 1942 the State of Ohio began buying land and now owns and manages the 800 ha Resthaven Wildlife

Area. The area still supports a wet prairie/fen community that is less than 50 ha in size. This remnant is probably not reflective of the original community composition because of the preponderance of introduced species, the lack of natural disturbance, and a disrupted water regime. Another area described by Dachnowski that supported a wet prairie/fen community, the 162 ha peat deposit at Medway Bog (Clark County), is currently being mined for peat.

Morgan Swamp (Ashtabula County) was described by Hicks (1933) as a 1,200 ha swamp forest-shrub swamp community of which 500 ha was a *Tsuga canadensis* (L.) Carr. (hemlock) forest. According to Hicks, extensive logging of the hemlock began in the middle 1800s. Within 30 years the original forest had been entirely removed and massive fires ravaged the wetland. After about 75 years of abandonment, a sizeable portion of wetland has reverted to swamp forest and open marsh. The historical impacts on the site have substantially changed the community composition and hemlocks are absent from much of the area. The Ohio Chapter of The Nature Conservancy owns and manages 325 ha. Current threats to Morgan Swamp include gas and oil wells and the establishment of invasive plants such as *Phragmites australis* (Cav.) Steudel (giant reed grass).

CONCLUSIONS

Based on an estimated size of 32,198 ha, approximately 1,248 ha of peatlands with typical peatland flora remain in Ohio today (Table 1). In 1912 Dachnowski wrote that "the present bog and plant societies are being destroyed so rapidly that some historical record is indeed of primary importance. In almost all places the work of man has inaugurated conditions by cutting, clearing, burning, ditching, pasturing, and cultivating which have destroyed much of the original flora of Ohio." By 1912, according to Dachnowski's report, approximately 75% of the peatlands had been greatly impacted.

To date, 32 peatlands totalling 824 ha or 66% of extant peatlands have been protected through some type of public or private ownership and set aside as preserves (Table 1). These areas, however, remain under threat from changes in, or manipulation of, adjacent properties. At Cedar Bog (Champaign County), adjacent land uses such as intensive agriculture, railroad and road construction, as well as past ditching are continuing to impact the system by lowering the regional water table (Forsyth 1974). The lowered water table and absence of natural disturbance may be responsible for a continuing shrinkage of the open fen meadow and community succession favoring a *Thuja occidentalis* L. (arbor vitae) swamp forest (Collins et al. 1982). Aggressive non-native taxa, especially *Rhamnus frangula* L. (European buckthorn), have invaded even pristine peatlands and threaten to crowd out native shrubs (Andreas and Bryan 1990). *Rhamnus frangula* has severely impacted Myersville Fen and Twinsburg Fen (Summit County), similar to what occurred at Volo Bog, Lake County, IL (Sheviak and Haney 1973). *Typha angustifolia* L. and *T. latifolia* L. (cattails) have moved into Herrick Fen (Portage County) after a decade

of changes in water level from beaver activity.

In summary, less than 2% (1.6%) of the original peatlands estimated to occur in Ohio still support a peatland flora. The other 98% have been lost due to human activity primarily for the purpose of agriculture, recreation, water level changes, mining, and development.

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