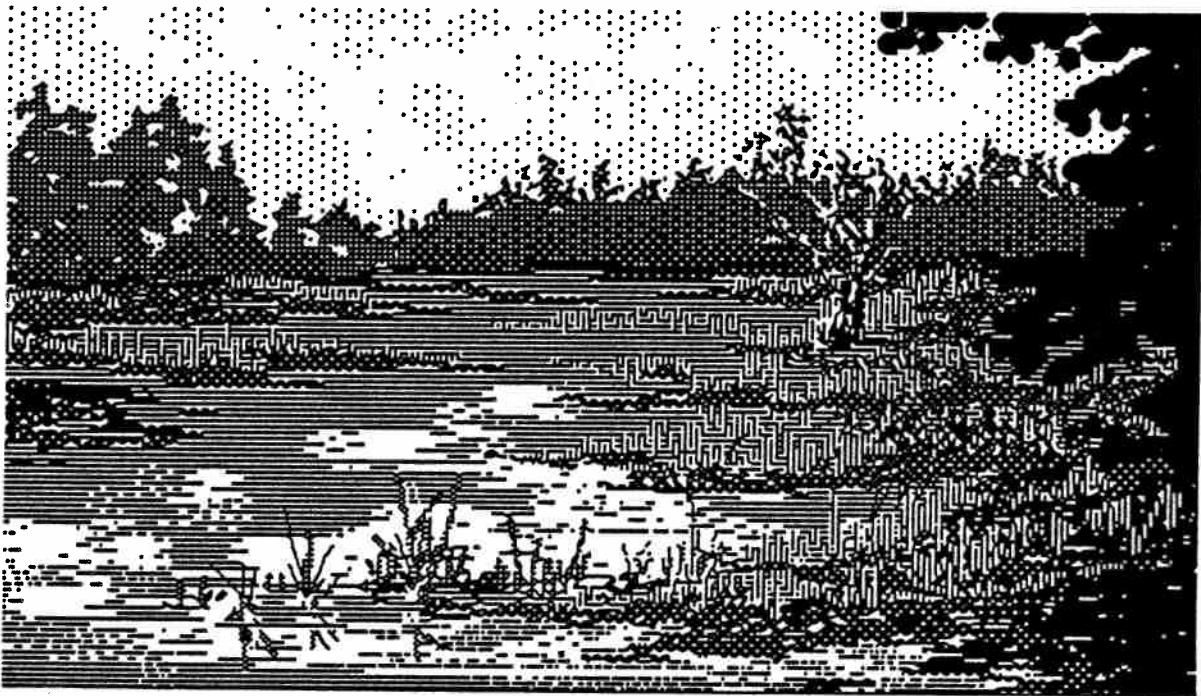


Western Washington
Freshwater Wetlands
Volume II. Southern Puget Trough



Report to the Department of Ecology by the
Washington Natural Heritage Program
Department of Natural Resources

Contract No. C0087090

DEPARTMENT OF NATURAL RESOURCES

Brian Boyle
Commissioner of Public Lands

Art Stearns
Supervisor

Mary Jo Lavin, Ph.D.
Deputy Supervisor - Resource Protection
and Services

Forest Regulation and Conservation Division

Arden Olson
Manager

Washington Natural Heritage Program

Mark Sheehan
Manager

Reid Schuller
Natural Area Scientist

Linda Kunze
Wetland Ecologist

Rex Crawford, Ph.D.
Plant Ecologist

Deborah Naslund
Data Manager

Nancy Sprague
Assistant Data Manager

Samira Kauthar
Secretary

PUGET TROUGH FRESHWATER WETLANDS

A Summary of Biologically Significant Sites

Phase II: Southern Puget Trough Impounded Wetlands

by

Linda M. Kunze
Wetland Ecologist

Washington Natural Heritage Program
Forest Regulation and Conservation Division
Department of Natural Resources
Olympia, Washington

Report to

Washington Department of Ecology
Olympia, Washington

Contract No. C0087090

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ABSTRACT

This study identifies high quality native wetlands which occur in the southern portion of the Puget Trough region. It focuses on impounded freshwater wetlands which have rooted vascular plant vegetation. The report includes:

1. A list of relatively pristine native wetlands,
2. A list of wetlands which have been disturbed but may be possible to restore,
3. Descriptions of each of the wetland sites listed in 1 and 2 above,
4. A classification of native vegetated wetlands, and
5. Descriptions of wetland communities.

ACKNOWLEDGMENTS

I would like to thank all of the people who contributed to this report. First, the private landowners who allowed me to survey their lands. Second, the many researchers and interested persons who informed us of possible high quality wetlands, and added to our knowledge of the land use history and processes of some of the wetlands. Third, Heritage staff members: Mark Sheehan who edited this report; Rex Crawford who assisted with the classification; Jonathan Friedman who contributed his expertise on wetland soils and hydrology; and Nancy Sprague who produced the report maps.

TABLE OF CONTENTS

Abstract	ii
Acknowledgments.	iii
Table of Contents.	v
List of Figures.	vii
Introduction	1
Study Area	1
Methodology.	3
Initial Site Selection.	3
Field Surveys	4
Classification.	4
Final Site Selection Criteria	5
Site Lists	8
Site Descriptions.	11
First Tier Site Descriptions.	11
Arrowhead Bog.	13
Bald Hill Gorge.	17
Beargrass Bog #1	19
Beargrass Bog #2	23
Collage Bog.	25
Cranberry Lake, Mason County	29
Cranberry Marsh #1	33
Cranberry Marsh #2	35
Cranberry Marsh #5	37
Double Yolk Bog.	41
Elbow Lake	45
North Simpson Bog.	47
PICO Parkland.	49
Shumocher Creek.	51
South Jarrell Creek.	55
Second Tier Site Descriptions	57
Cranberry Lake, Pierce County.	59
Cranberry Marsh #6	63
Elbow Lake #5.	65
Foram Pond	67
Fort Lewis Access Bog.	69
Highway 3 Bog.	73
Ink Blot Wetland	75
Lake Armstrong	79
Lily Pond.	81
Mud Lakes.	83

North Elbow Lake	87
North Morrow Lake.	89
Panhandle Kettles.	93
Sheehan Lake	97
Southeast Nahwatzel Lake	99
The Potholes	103
Twin Lakes	105
References	107
Appendix A. Preliminary Classification of Puget Trough Freshwater Impounded Wetlands.	109
Appendix B. Puget Trough Freshwater Impounded Wetland Community Descriptions.	113

LIST OF FIGURES

Figure 1.	Study Area	2
Figure 2.	Location of First and Second Tier Sites.	9
Figure 3.	Arrowhead Bog Location Map	12
Figure 4.	Bald Hill Gorge Location Map	16
Figure 5.	Beargrass Bog #1 Location Map.	18
Figure 6.	Beargrass Bog #2 Location Map.	22
Figure 7.	Collage Bog Location Map	24
Figure 8.	Cranberry Lake, Mason County Location Map.	28
Figure 9.	Cranberry Marsh #1 Location Map.	32
Figure 10.	Cranberry Marsh #2 Location Map.	34
Figure 11.	Cranberry Marsh #5 Location Map.	36
Figure 12.	Double Yolk Bog Location Map	40
Figure 13.	Elbow Lake Location Map.	44
Figure 14.	North Simpson Bog Location Map	46
Figure 15.	PICO Parkland Location Map	48
Figure 16.	Shumocher Creek Location Map	50
Figure 17.	South Jarrell Creek Location Map	54
Figure 18.	Cranberry Lake, Pierce County Location Map	58
Figure 19.	Cranberry Marsh #6 Location Map.	62
Figure 20.	Elbow Lake #5 Location Map	64
Figure 21.	Foram Pond Location Map.	66
Figure 22.	Fort Lewis Access Bog Location Map	68
Figure 23.	Highway 3 Bog Location Map	72
Figure 24.	Ink Blot Wetland Location Map.	74
Figure 25.	Lake Armstrong Location Map.	78
Figure 26.	Lily Pond Location Map	80
Figure 27.	Mud Lakes Location Map	82
Figure 28.	North Elbow Lake Location Map.	86
Figure 29.	North Morrow Lake Location Map	88
Figure 30.	Panhandle Kettles Location Map	92
Figure 31.	Sheehan Lake Location Map.	96
Figure 32.	Southeast Nahwatzel Lake Location Map.	98
Figure 33.	The Potholes Location Map.	102
Figure 34.	Twin Lakes Location Map.	104

INTRODUCTION

Over the last few years, the public has become more aware of the values and functions of wetlands. At the same time, information has become available on the amount and rate of destruction of these systems. The result has been a heightened public concern about the protection and rehabilitation of wetland systems.

The Washington Department of Ecology determined a need for wetland studies which would classify and describe wetland types, identify high quality native systems, and identify wetlands which, though disturbed, have the potential to be restored.

To satisfy part of this need, the Department of Ecology contracted with the Department of Natural Resources, Natural Heritage Program to inventory wetlands located within the lowlands of the southern Puget Trough region.

Specifically, this study includes native, impounded, freshwater wetlands which are vegetated by rooted vascular plants. Although it includes a few of them, this report does not focus on wetlands associated with flowing water, nor those wetlands vegetated exclusively with nonvascular or floating aquatic vegetation.

This report provides the following information.

1. A list of "pristine" native wetlands (first tier).
2. A list of wetlands which have been disturbed but which have been, or may be able to be, restored (second tier).
3. Descriptions of each of the sites listed in numbers 1 and 2.
4. A classification of native, vegetated wetlands.

Although a large percentage of the vegetated wetlands located in the lowlands of the southern Puget Trough region were reviewed, not all could be included in this study. With further work, it is probable that more sites could be added to the list of high quality sites identified here.

STUDY AREA

The study area includes the lowlands of the southern Puget Trough region, that is, lands below 2,000 feet in Pierce, Thurston, Mason, and southern Kitsap counties, with the exception of Indian and military owned lands (figure 1).

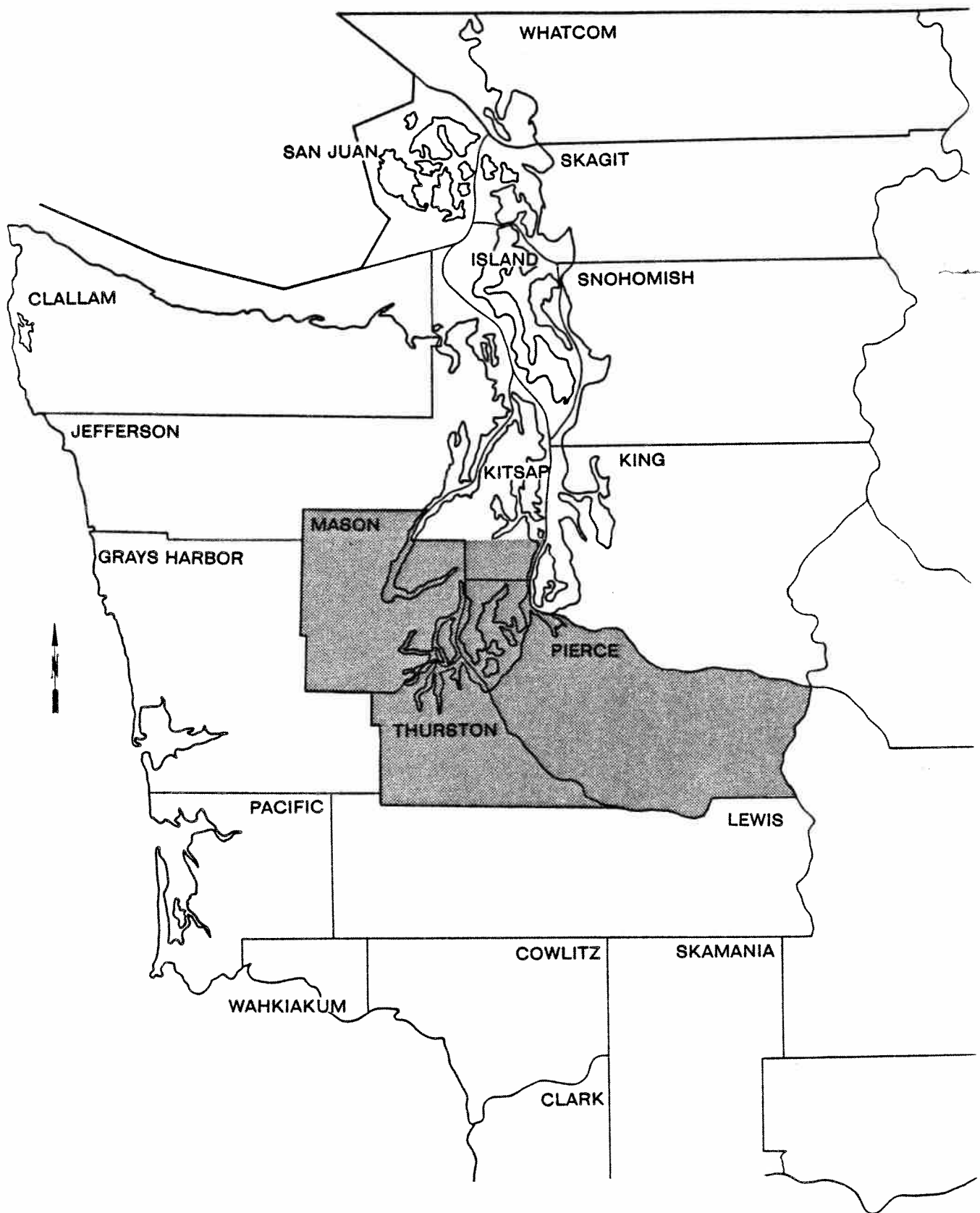


Figure 1. Study Area

METHODOLOGY

INITIAL SITE SELECTION:

Sites for initial study were selected: 1) by reviewing U.S.G.S. 7.5 and 15 minute quadrangle maps; 2) by reviewing the latest available aerial photographs printed at a scale of 1:12,000; 3) by a retrieval of data already contained within the Natural Heritage Database; and 4) by reviewing leads on high quality wetlands provided by researchers and knowledgeable landowners.

The criteria that were used in this initial site selection were:

1. The degree of human-related physical disturbances. These disturbances included: damming, diking, ditching, filling, draining, vegetation removal, mining of the substrate, or inclusion within a sludge disposal area. The site continued to be considered for survey if the disturbance appeared to be relatively minor or isolated. Otherwise, the existence of any of these disturbances resulted in the elimination of a site from further consideration.
2. Adjacent land use. Some adjacent land uses are more disruptive of wetlands than are others. Adjacent land uses include: timber production, pasture, agriculture, industry, powerline right-of-way, roads, railroads, recreational development, urban development, and rural development. If an adjacent land use was highly disruptive, the wetland may have been eliminated from further consideration.
3. The presence and quality of an upland buffer. Assessment of the quality of a buffer was based on 1) the width of the buffer in relationship to adjacent land uses, 2) the composition and age of the buffer, and 3) current uses within the buffer. If a buffer did not exist between a wetland and a disruptive adjacent land use, and the wetland appeared disturbed, then the site was usually eliminated from further consideration for field survey. If, on the other hand, the site appeared undisturbed, it continued to be considered for field surveys, despite the absence of a buffer.
4. The minimum size for sites to be considered was arbitrarily set at two acres.

Sites selected through this process were then ranked according to their apparent quality, and scheduled for field surveys.

FIELD SURVEYS:

Field surveys were conducted during the summer of 1986. Existing data from the Natural Heritage Database were collected in 1985 using the same methodology employed during the 1986 field survey.

Upon visiting a site, a preliminary determination was made to include or eliminate the site from further consideration. Site inclusion was based on the cover and frequency values of non-native plant species, along with the criteria for initial site selection outlined above.

For all survey sites, data were collected on physical and biotic features, hydrology, soils, adjacent land use, and historic use. Physical features included topography, elevation, exposure, special climatic conditions, kind and means of impoundment, and wetland configuration. Data on hydrology included water depth, apparent water level fluctuation, drainage patterns within the wetland's basin, and water source.

Soils generally were classified in the field as: sphagnum peat, fibrous peat, heath peat, woody peat, organic muck, silts, sands, glacial till, or outwash. Soils data were also gathered from the U.S. Soil Conservation Service. Peat soil definitions follow Rigg (1958).

Adjacent land use and historic uses were determined through site observation, talking with owners of a site and adjacent areas, agency personnel, county assessor's office staff, historical records, and aerial photographs.

The biologic evaluation of a site included a detailed description of the vegetation. Assemblages of native plant species were identified during a reconnaissance of each wetland. Lists of species and their percent cover values were recorded for each assemblage. Plant species nomenclature follows Hitchcock and Cronquist (1973). Wildlife species or their sign were noted.

CLASSIFICATION:

An initial classification of relatively undisturbed, native, wetland vegetation was developed (Appendix A). It synthesized the data from the field surveys, the Natural Heritage Database, and the literature.

A matrix, of species cover values by stand, was developed. The matrix consisted of data collected from the field surveys and the Natural Heritage Database. The stands were the assemblages identified in the reconnaissance surveys.

From this matrix, wetland communities were identified in the following way. Stands (assemblages) were arrayed to reflect similarities in their species composition. If three or more stands had similar species composition and cover values, they were lumped to form a wetland community considered to be recurring in the landscape. A wetland community considered to not recur in the landscape was identified if 1) only two stands had similar species composition and cover values, 2) a stand had a species composition dissimilar from any other, or 3) two or more communities had similar dominant species but otherwise very different species composition and cover values. Communities identified in this way were compared with those described in the literature. Descriptions of these communities, and their average percent species cover values, are in Appendix B.

FINAL SITE SELECTION CRITERIA:

The following criteria were applied to "first tier" sites, that is, those sites which are the most pristine examples of native, undisturbed, wetland systems:

1. No evidence of human-caused topographic or hydrologic alteration of the wetland,
2. Exotic plant species occurred infrequently if at all,
3. Relatively little known or apparent human-caused disturbance of the native vegetation,
4. Existence of an adequate buffer at sites where adjacent land use was potentially degrading, and
5. No known major water quality problems.

If a site did not meet these criteria, it could still be listed as a "first tier" site if it was the highest quality known example of a community, or contained particularly important populations of plant or animal species listed as endangered or threatened in Washington.

The following criteria were applied to "second tier" sites, that is, those sites which were disturbed but have good potential for restoration:

1. No, or isolated, human alteration of the wetland topography,
2. No human caused alteration of the hydrology of the wetland, or else the wetland appeared to have recovered from the alteration,

3. Low cover and frequency of exotic plant species,
4. Relatively little human-related disturbance of the native vegetation, or excellent recovery from past disturbance,
5. If the wetland system was degraded, it still contained a viable and high quality example of a wetland community, and
6. No known major water quality problems.

SITE LISTS

FIRST TIER SITES:

1. Arrowhead Bog
2. Bald Hill Gorge
3. Beargrass Bog #1
4. Beargrass Bog #2
5. Collage Bog
6. Cranberry Lake, Mason County
7. Cranberry Marsh #1
8. Cranberry Marsh #2
9. Cranberry Marsh #5
10. Double Yolk Bog
11. Elbow Lake
12. North Simpson Bog
13. PICO Parkland
14. Shumocher Creek
15. South Jarrell Creek

SECOND TIER SITES:

16. Cranberry Lake, Pierce County
17. Cranberry Marsh #6
18. Elbow Lake #5
19. Foram Pond
20. Fort Lewis Access Bog
21. Highway 3 Bog
22. Ink Blot Wetland
23. Lake Armstrong
24. Lily Pond
25. Mud Lakes
26. North Elbow Lake
27. North Morrow Lake
28. Panhandle Kettles
29. Sheehan Lake
30. Southeast Nahwatzel Lake
31. The Potholes
32. Twin Lakes

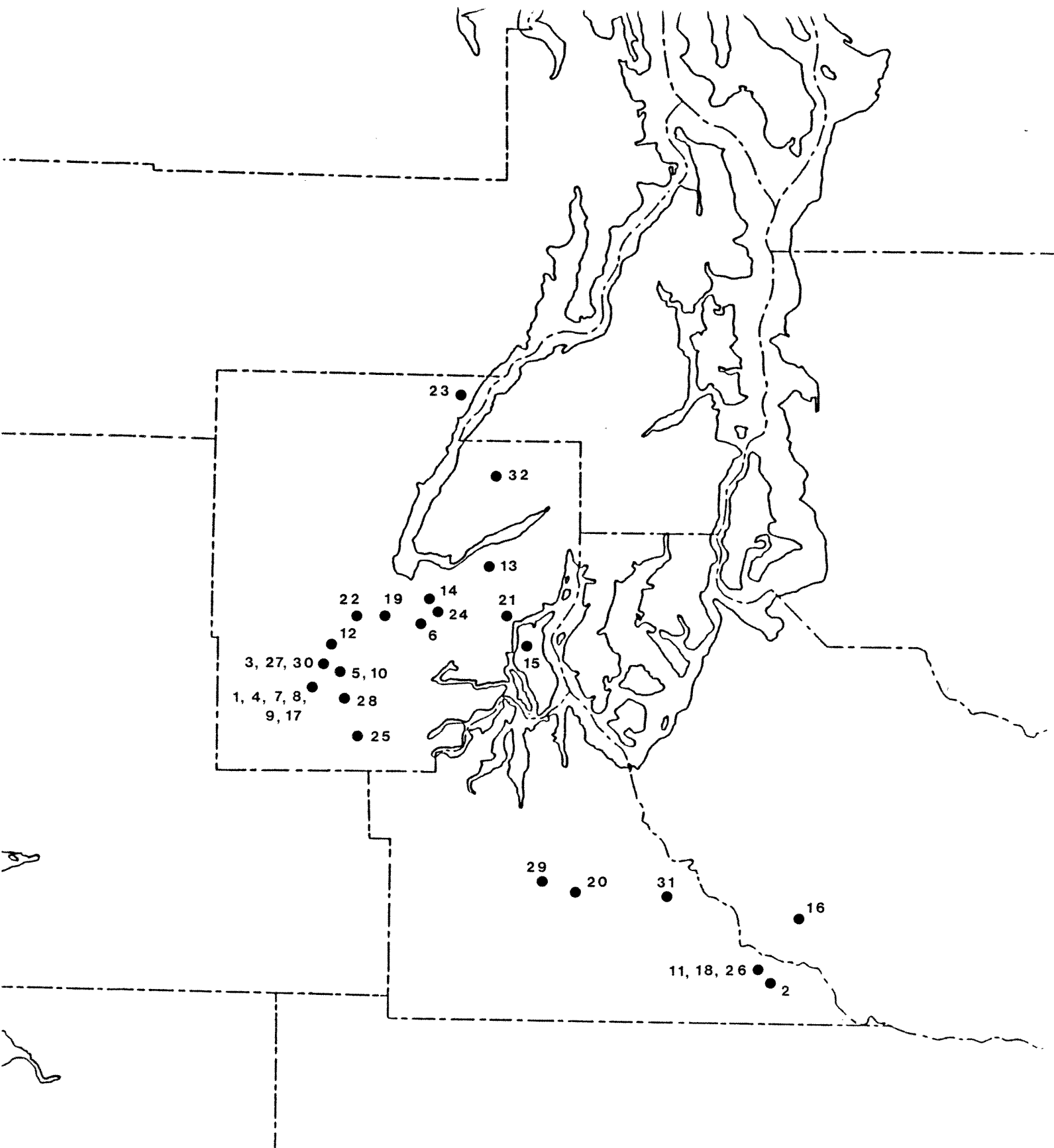


Figure 2. Location of First and Second Tier Sites

FIRST TIER SITE DESCRIPTIONS

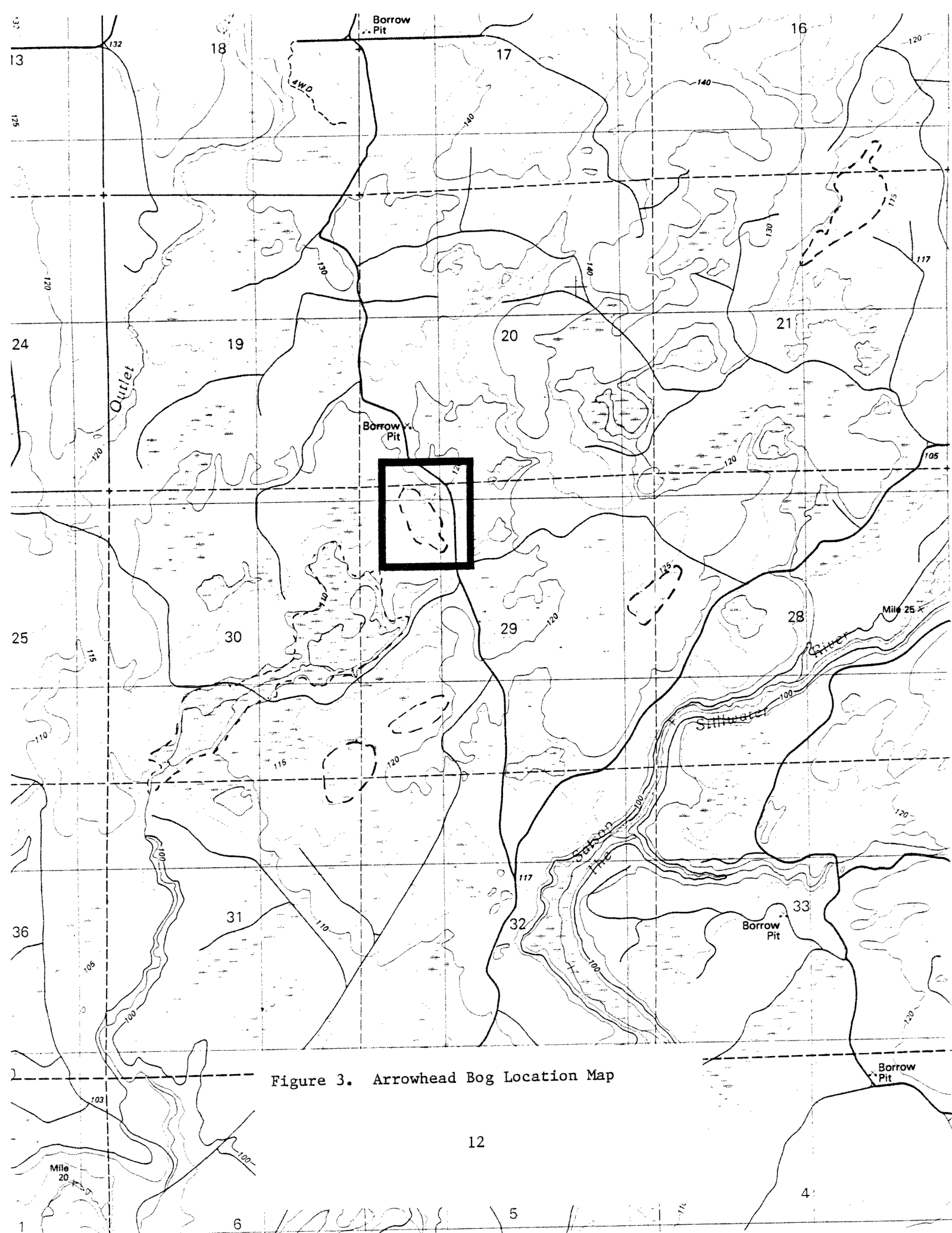


Figure 3. Arrowhead Bog Location Map

ARROWHEAD BOG

LOCATION: Mason County; Section 29, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Arrowhead Bog is a first tier site. It contains 1 sphagnum bog community and 2 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community

Freshwater Wetland:

1. Spiraea douglasii community
2. Salix spp. community

DESCRIPTION:

Physical: Arrowhead Bog is a 12 acre wetland located at 115 feet elevation on a rolling moraine. The wetland is oblong, oriented northwest-southeast. It has no apparent channeled inflow, but has an outflow channel which drains to the south.

The freshwater wetland is seasonally flooded to supersaturated. Its soils are soft, a mixture of fibrous, heath, and woody peat. The sphagnum bog area is probably seasonally flooded but is drier than the freshwater wetland. The soils are sphagnum peat with some fibrous and heath peat. The wetland is underlain by glacial till.

Biological: The sphagnum bog and freshwater wetland communities intergrade. Generally the sphagnum bog occupies the center of the wetland area and is covered with an example of the Kalmia occidentalis/Sphagnum spp. community. A large number of snags, and small Tsuga heterophylla and Thuja plicata occur over the bog area.

The freshwater wetland encircles and grades into the bog. The landward zone is predominantly an example of the Salix spp. community that has high percent cover of Pyrus fusca, Spiraea douglasii, and Carex sitchensis. Towards the center of the wetland this community grades into a second freshwater wetland community, the Spiraea douglasii/Carex sitchensis community. This community is probably ecotonal between a freshwater S. douglasii community and a sphagnum bog S. douglasii/Sphagnum spp. community.

CONDITION: There is no apparent human disturbance of Arrowhead Bog. The large number of snags suggests that the hydrology of the wetland was altered at one time or that the wetland burned. Neither of these possible events has been substantiated. The

uplands were all logged at one time but any effects of that operation are no longer visible.

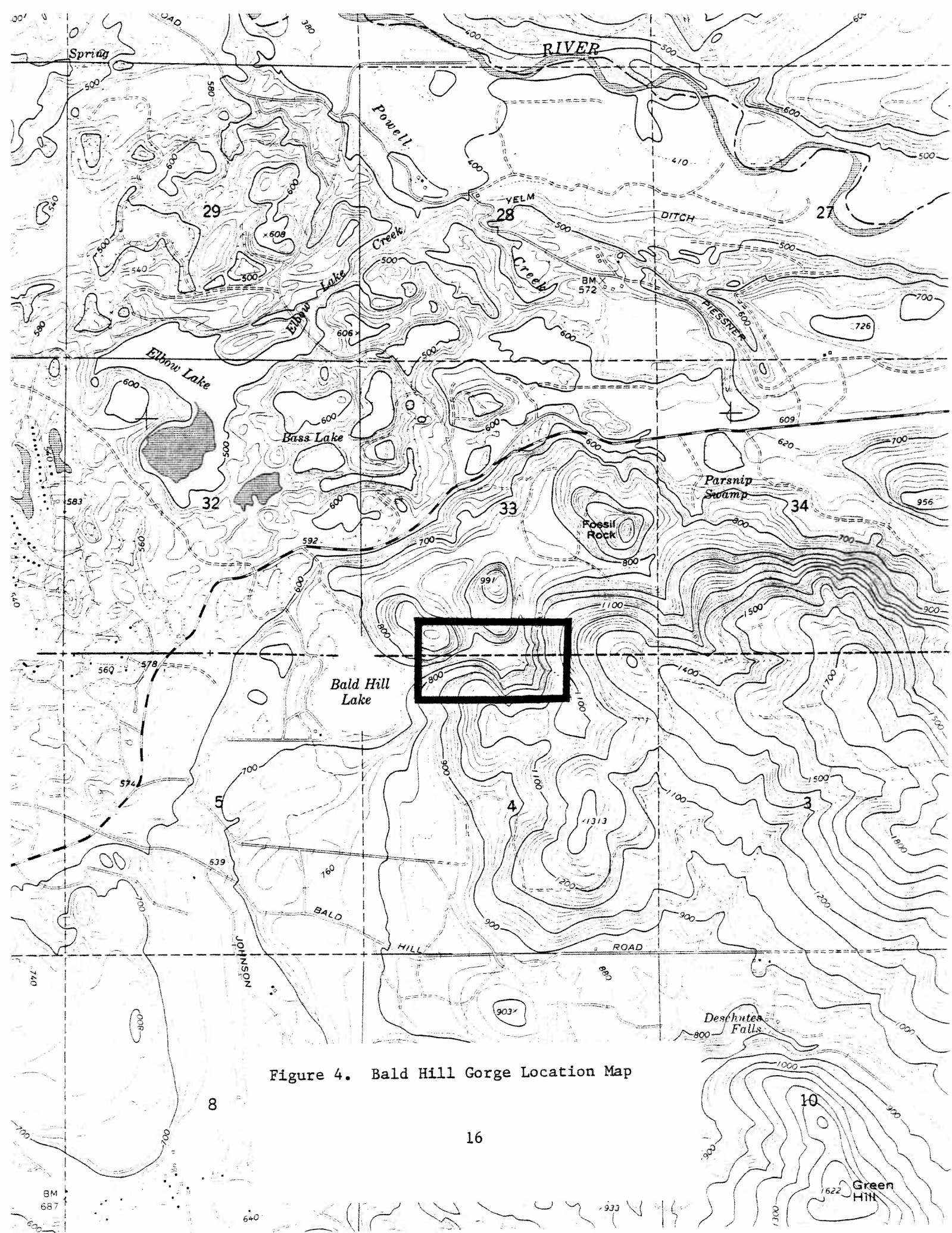


Figure 4. Bald Hill Gorge Location Map

BALD HILL GORGE

LOCATION: Thurston County; Section 4, Township 15 North, Range 3 East and Section 33, Township 16 North, Range 3 East, Willamette Meridian.

SIGNIFICANCE: Bald Hill Gorge is a first tier site and contains 3 freshwater wetland communities.

FEATURES: Freshwater Wetland:

1. Typha latifolia community
2. Dulichium arundinaceum community
3. Potamogeton natans community

DESCRIPTION:

Physical: Bald Hill Gorge wetland is 9 acres and is located at an elevation of 760-780 feet in an east-west oriented gorge. The gorge is located on the west side of Bald Hill in the foothills of the Cascade Mountains. It drains to the west into Bald Hill Lake.

The nearly vertical sides of the gorge are basalt and andesite. The wetland soils are black, anoxic, organic muck with some fibrous peat and woody material. Portions of the wetland are permanently flooded. Other portions are seasonally flooded to supersaturated.

Biological: The permanently flooded portions of the wetland are dominated by floating and rooted aquatic vegetation, primarily Lemna minor and Potamogeton natans.

The seasonally flooded area has a rich flora. Dulichium arundinacea and Sparganium emersum codominate over the wettest areas. Typha latifolia, Carex rostrata and Oenanthe sarmentosa codominate on firmer soils. Inland, Spiraea douglasii is codominant with Typha latifolia. Alnus rubra and Fraxinus latifolia occur around a small portion of the upland-wetland margin.

CONDITION: The wetland is in excellent condition. The adjacent uplands have never been logged. There are hiking trails which lead up to and part way around the wetland but access is difficult and the wetland appears not to receive many visitors. There is one small area on the north side of the wetland which appears to have been disturbed at one time. It has a few clumps of Juncus effusus and one patch of Phalaris arundinacea.

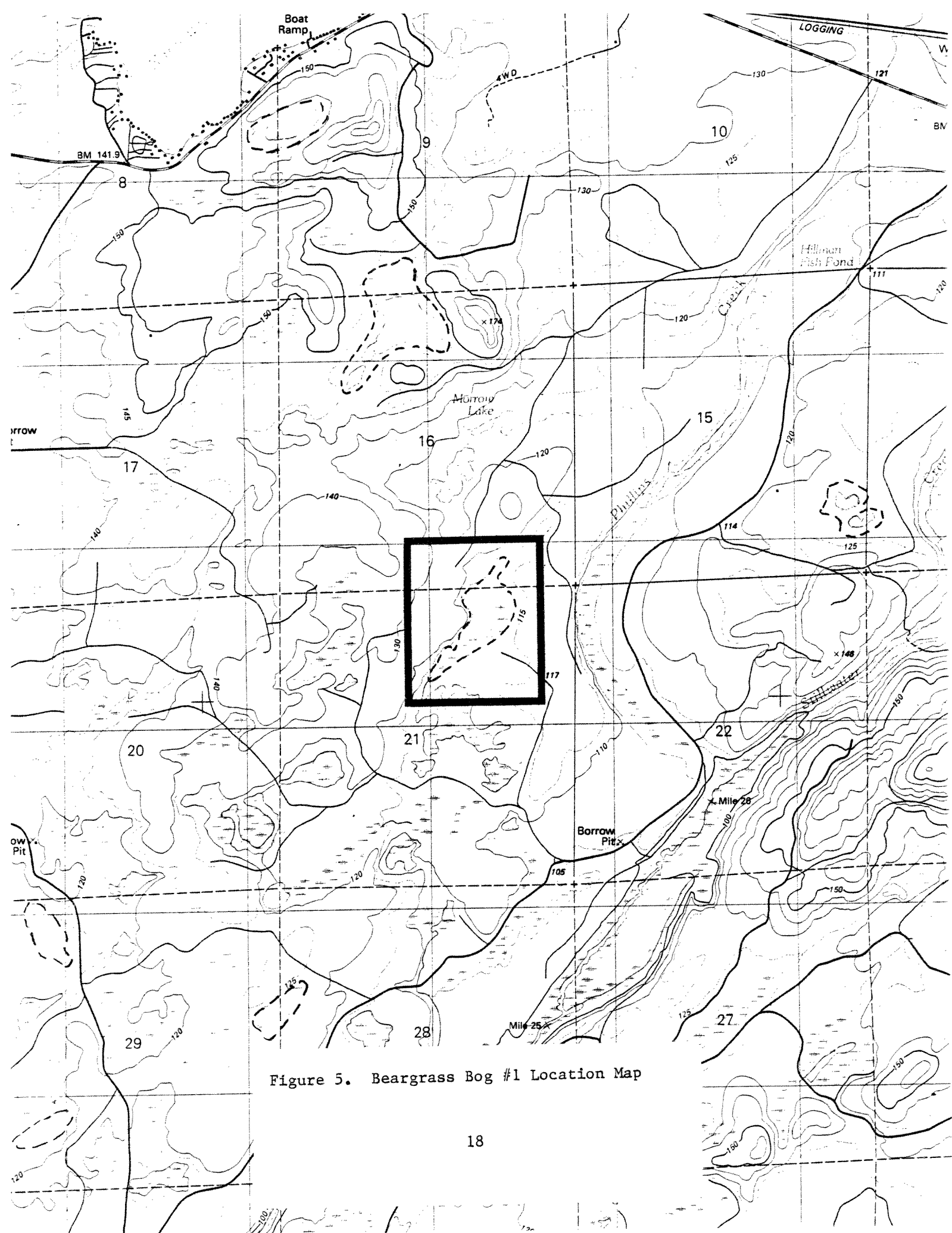


Figure 5. Beargrass Bog #1 Location Map

BEARGRASS BOG #1

LOCATION: Mason County; Sections 16 and 21, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Beargrass Bog #1 is a first tier site. It contains 2 sphagnum bog communities and 1 freshwater wetland community.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community
2. Spiraea douglasii/Sphagnum spp. community

Freshwater Wetland:

1. Spiraea douglasii community

DESCRIPTION:

Physical: Beargrass Bog #1 is a 16 acre wetland located at an elevation of 115 feet on a rolling moraine. The wetland is oblong, oriented northeast-southwest. It has a seasonal inflow and outflow, and drains to the southwest.

The freshwater wetland soils are black organic matter, mostly composed of fibrous and heath peat. The bog area soils are a mixture of sphagnum, fibrous, and heath peat.

The freshwater wetland area is seasonally flooded to super-saturated. The sphagnum bog area is drier but may be seasonally flooded. There is a small, seasonal, bog pond within the sphagnum bog area.

Biological: There are 6 acres of the Kalmia occidentalis/Sphagnum spp. community along the southeast side of the wetland. It is a typical example of this community, except for the presence of Xerophyllum tenax which occurs in the northeast end of the bog. Within this area is a small seasonal pond and some depressions that have small examples of communities dominated by Carex sitchensis and Dulichium arundinaceum, or a mixture of Scirpus subterminalis and Nuphar polysepalum.

Along the northwest side of the Kalmia occidentalis/Sphagnum spp. community is a 2.5 acre example of the Spiraea douglasii/Sphagnum spp. community. It is a typical example except that it has high percent cover of Carex vesicaria.

The 7.5 acre freshwater wetland is located along the northwest side of the wetland and is coincident with the seasonal drainage. The area is dominated by tall Spiraea douglasii, but has relatively high cover of Carex obnupta throughout. Salix spp. have high cover to the southwest.

CONDITION: Beargrass Bog #1 has no evidence of human disturbance. The uplands were logged a long time ago and no buffer was retained. It is likely that the outflow was crossed by a logging road at one time but the crossing is no longer evident.

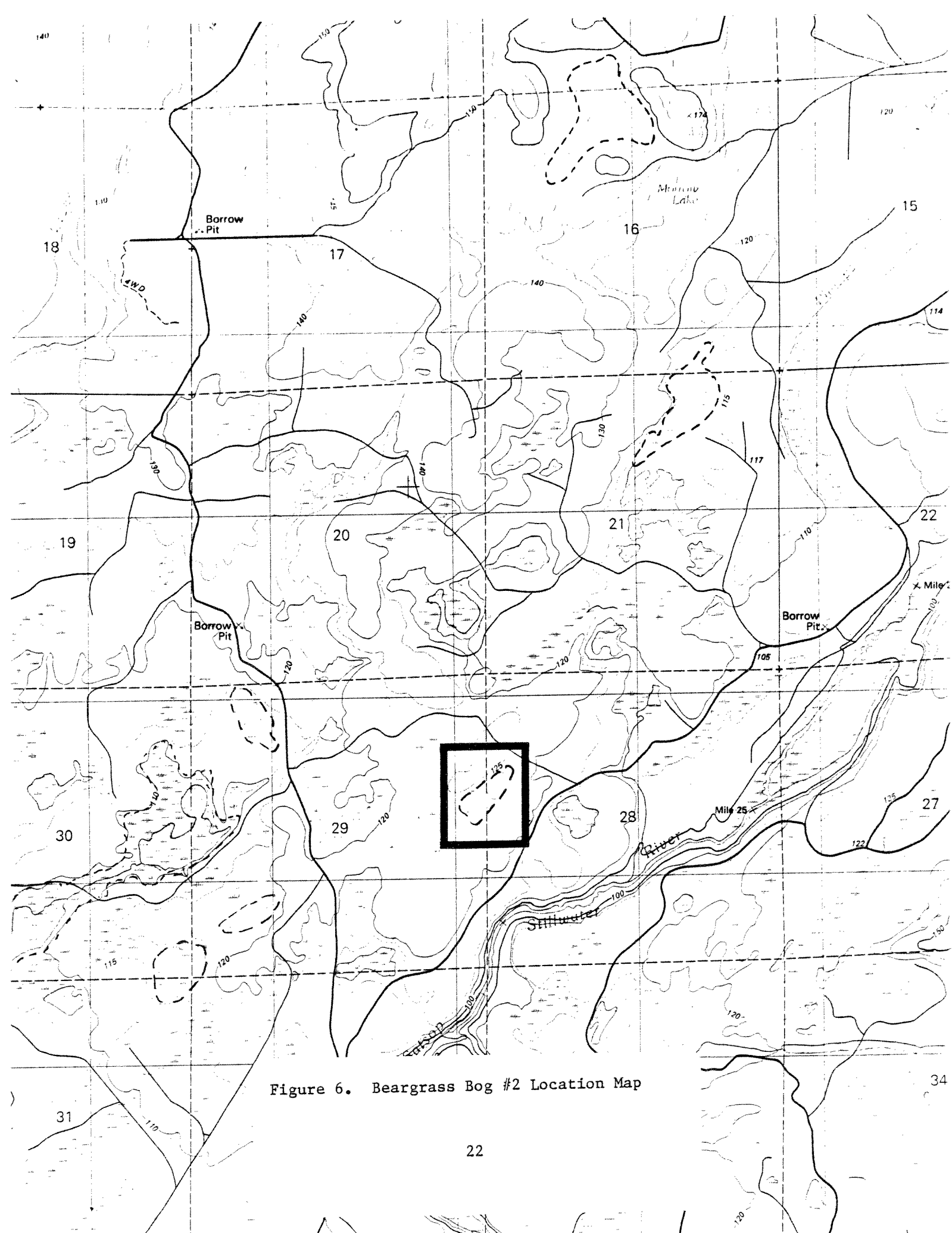


Figure 6. Beargrass Bog #2 Location Map

BEARGRASS BOG #2

LOCATION: Mason County; Sections 28 and 29, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Beargrass Bog #2 is a first tier site which contains 2 sphagnum bog communities.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community
2. Spiraea douglasii/Sphagnum spp. community

DESCRIPTION:

Physical: Beargrass Bog #2 is a 9 acre bog located at 125 feet elevation on a rolling moraine. It is a relatively dry bog, with no standing water, and no apparent channeled inflow or outflow. The soils are sphagnum, fibrous, and heath peat.

Biological: The sphagnum bog is predominantly an example of a Kalmia occidentalis/Sphagnum spp. community. It is unusual in that Xerophyllum tenax occurs in it. An example of the Spiraea douglasii/Sphagnum spp. community is located around the wetland's outer margin and is intermixed with the Kalmia occidentalis/Sphagnum spp. community.

CONDITION: Beargrass Bog #2 has no visible human disturbance. The uplands were all logged at one time and no buffer was retained. Any effects of the logging are no longer apparent.

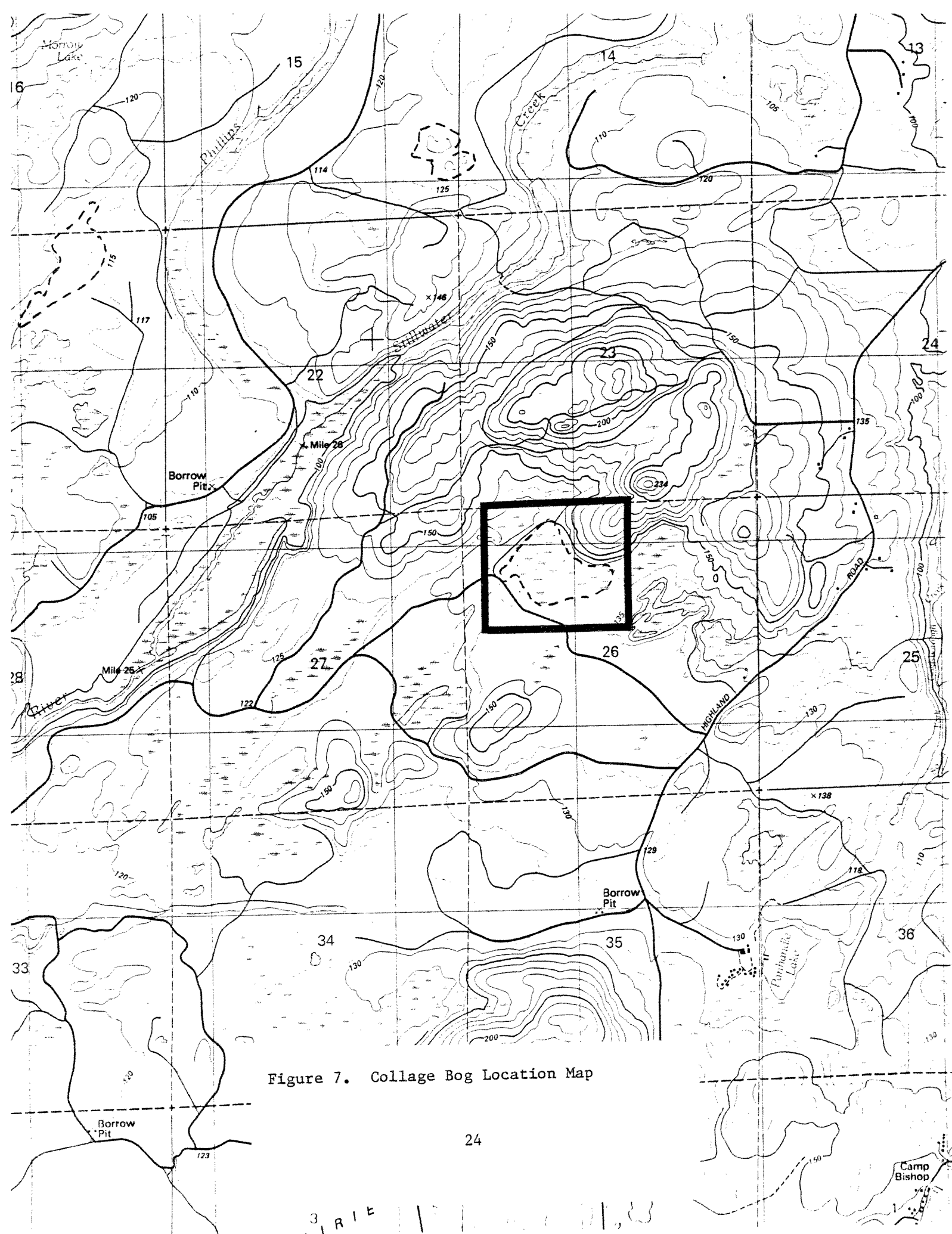


Figure 7. Collage Bog Location Map

COLLAGE BOG

LOCATION: Mason County; Section 26, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Collage Bog is a first tier site. It contains 5 sphagnum bog communities and 3 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community
2. Ledum groenlandicum/Sphagnum spp. community
3. Spiraea douglasii/Sphagnum spp. community
4. Pinus contorta/Ledum groenlandicum/Sphagnum spp. community
5. Tsuga heterophylla/Ledum groenlandicum/Sphagnum spp. community

Freshwater Wetland:

1. Spiraea douglasii community
2. Pyrus fusca community
3. Thuja plicata community

DESCRIPTION:

Physical: Collage Bog is an approximately 30 acre wetland located at 140 feet elevation on a rolling moraine. The wetland is oval shaped. It receives surface run-off and seasonal drainage from the northeast, and drains to the southwest into the East Fork Satsop River.

The wetland is shallow and is underlain by glacial till. The forested wetland probably has permanently flooded, organic soils composed of needles and woody material. The bog soils are a mixture of sphagnum, fibrous, heath, and woody peat which are wet to seasonally flooded. The freshwater wetland soils vary from fibrous peat, to fibrous and heath peat, all seasonally to permanently flooded.

Biological: The sphagnum bog is about 15 acres and is divided into two areas. The western area progresses north to south from a very small Tsuga heterophylla/Ledum groenlandicum/Sphagnum spp. community to a low growing shrub wetland which is a mixture of the Kalmia occidentalis/Sphagnum spp. and the Ledum groenlandicum/Sphagnum spp. communities. Farther to the south, this shifts to a wet Spiraea douglasii/Sphagnum spp. community.

The eastern bog area is similar to the western area except that the northernmost community is an example of the Pinus contorta/Ledum groenlandicum/Sphagnum spp. community instead of the Tsuga heterophylla/Ledum groenlandicum/Sphagnum spp. community.

The sphagnum bog communities are typical examples except for the S. douglasii/Sphagnum spp. community which is wetter than usual and grades into a freshwater S. douglasii community.

The freshwater wetland is about 15 acres and is primarily a Spiraea douglasii community. Around the wetland margins where it is seasonally flooded, the wetland is dominated by the Pyrus fusca community. The northern portion of the wetland has a small example of the Thuja plicata community. This area only received a cursory survey.

CONDITION: Collage Bog appears to have no human disturbance. There is a large number of snags in the bog, but this may be due to beaver activity in the system.

CRANBERRY LAKE, MASON COUNTY

LOCATION: Mason County; Sections 29 and 30, Township 21 North, Range 3 West, Willamette Meridian.

SIGNIFICANCE: Cranberry Lake is a first tier site. It contains 3 sphagnum bog communities and 1 freshwater wetland community.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community
2. Ledum groenlandicum/Sphagnum spp. community
3. Pinus contorta/Ledum groenlandicum/Sphagnum spp. community

Freshwater Wetland:

1. Alnus sinuata community

DESCRIPTION:

Physical: Cranberry Lake is located at 232 feet elevation in an outwash channel. The wetland area of primary interest is located at the far west end of the lake. A second small area is located on the south-central lake margin. The wetland and lake drain to the northeast into Lake Limerick.

The bog areas have sphagnum, heath, and woody peat soils. Portions of the bog are quaking mats while others have firm substrates. The substrates are saturated but not flooded. The freshwater wetland areas have fibrous and woody peat soils. These areas are permanently flooded with 1-3 feet of water. Both the bog and freshwater wetland are underlain by glacial till and gravelly outwash.

Biological: The sphagnum bog is about 90 acres. The Kalmia occidentalis/Sphagnum spp. and the Ledum groenlandicum/Sphagnum spp. communities are intermixed. They have a low relatively open growth form and occur on quaking sphagnum mats around the lake margin. The Pinus contorta/Ledum groenlandicum/Sphagnum spp. community occurs inland of the previous community on firmer drier sphagnum. The P. contorta form a nearly closed canopy. The understory is dominated by L. groenlandicum and Gaultheria shallon.

The freshwater wetland community is dominated by shrubs, primarily Alnus sinuata, 2 Salix spp., and Spiraea douglasii. This community has a great deal of microenvironmental variability which is reflected in changes in the understory species.

CONDITION: This area of Cranberry Lake is in good condition. The freshwater wetland and the Pinus contorta/Ledum groenlandicum/Sphagnum spp. community appear undisturbed. The

areas of Kalmia occidentalis/Sphagnum spp. and Ledum groenlandicum/Sphagnum spp. community are used by hunters, and contain trails and duck blinds. The hunter's use is restricted to the lake margin.

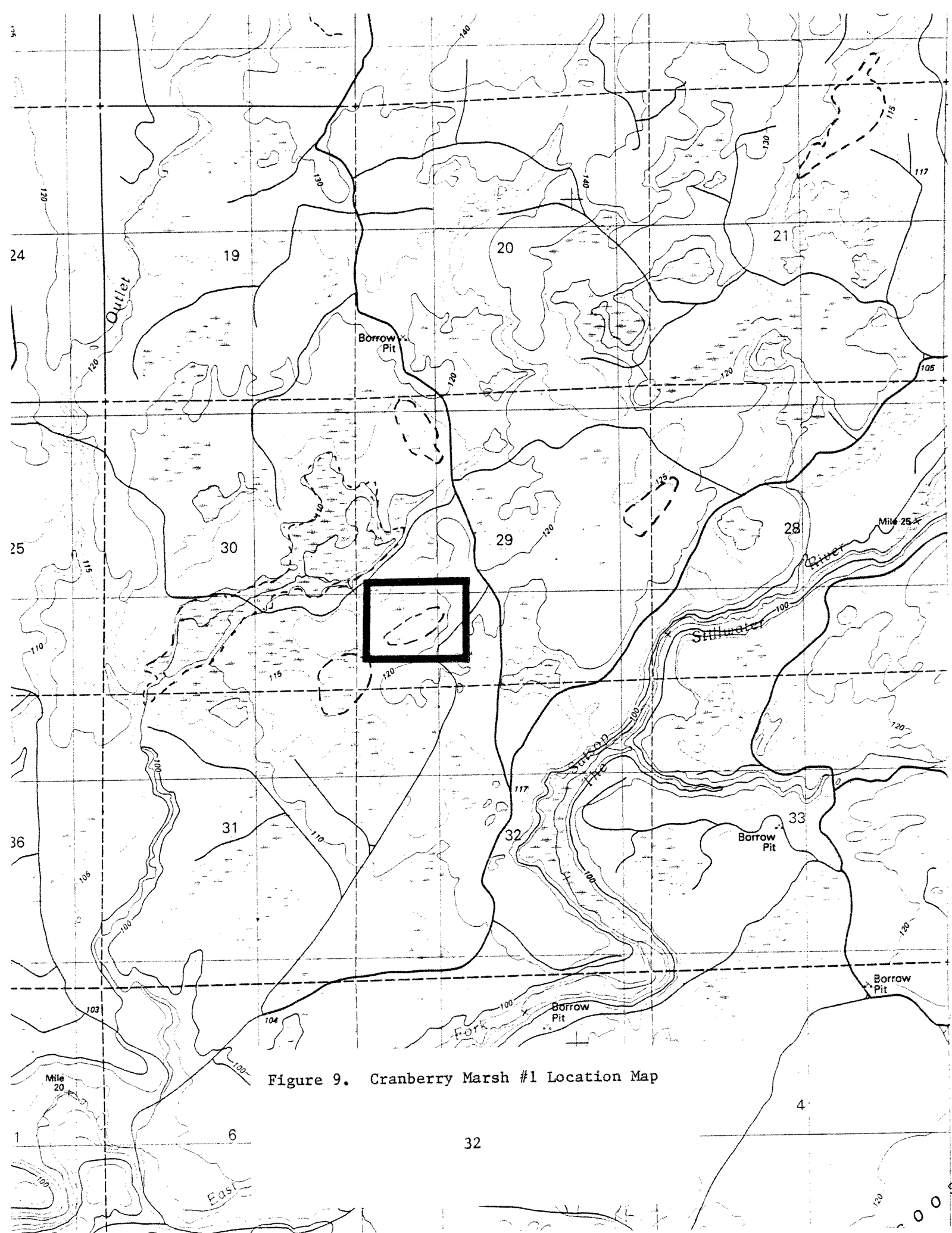


Figure 9. Cranberry Marsh #1 Location Map

CRANBERRY MARSH #1

LOCATION: Mason County; Section 29, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Cranberry Marsh #1 is a first tier site. It contains 1 sphagnum bog community and 1 freshwater wetland community.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community

Freshwater Wetland:

1. Salix spp. community

DESCRIPTION:

Physical: Cranberry Marsh #1 is located between 115 and 120 feet elevation on a rolling moraine. The wetland is about 7.5 acres, 3.5 acres are sphagnum bog and 4 acres are freshwater wetland.

The freshwater wetland is seasonally flooded to supersaturated. Its soils are a mixture of soft fibrous and woody peat. The sphagnum bog area may be seasonally flooded, but is drier than the freshwater wetland. The soils are sphagnum peat with some fibrous and heath peat. The wetland is underlain by glacial till and has no apparent channeled inflow or outflow.

Biological: The sphagnum bog occupies the center of the wetland area. It is covered with an example of the Kalmia occidentalis/Sphagnum spp. community which has 25% cover of Ledum groenlandicum and 25-40% cover of living sphagnum moss. Low wet spots are dominated by Carex rostrata.

The freshwater wetland encircles the bog and is dominated by shrubs, primarily Salix spp. and Spiraea douglasii. There is high cover of Calamagrostis canadensis and Carex sitchensis.

CONDITION: There is no apparent human disturbance of Cranberry Marsh #1. The uplands were all logged at one time but if that operation affected the wetland, those effects are no longer visible.

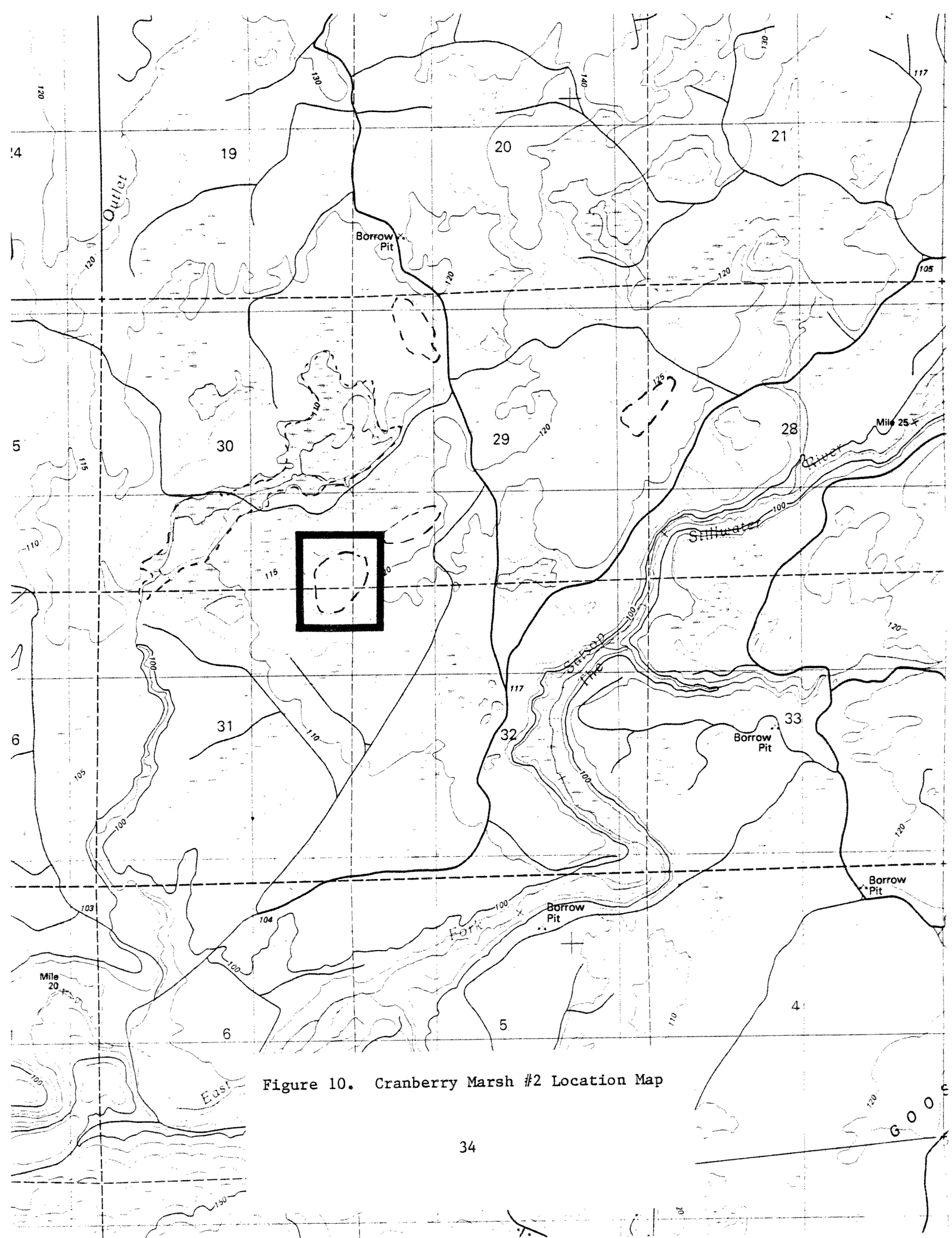


Figure 10. Cranberry Marsh #2 Location Map

CRANBERRY MARSH #2

LOCATION: Mason County; Sections 29, 30, 31 and 32, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Cranberry Marsh #2 is a first tier site. It contains 1 sphagnum bog community and 2 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community

Freshwater Wetland:

1. Spiraea douglasii community
2. Salix spp. community

DESCRIPTION:

Physical: Cranberry Marsh #2 is located at 115 feet elevation on a rolling moraine adjacent to a glacial outwash plain. The wetland is about 15.5 acres, 10 acres are sphagnum bog and 5.5 acres are freshwater wetland.

The freshwater wetland is seasonally flooded to supersaturated. Its soils are a mixture of soft fibrous and heath peat. The sphagnum bog area may be seasonally flooded, but is drier than the freshwater wetland. The soils are sphagnum peat with some fibrous and heath peat. The wetland is underlain by glacial till and possibly outwash gravel. It has no apparent channeled inflow or outflow.

Biological: The sphagnum bog occupies the center of the wetland area. It is covered with an example of the Kalmia occidentalis/Sphagnum spp. community which has 25% cover of Ledum groenlandicum, 10-15% cover of Vaccinium oxycoccos, and 60% cover of living sphagnum moss. Low wet spots are dominated by Carex rostrata.

The freshwater wetland encircles and grades into the bog. The landward zone is predominantly an example of the Salix spp. community and has high cover of Spiraea douglasii and Pyrus fusca. Towards the center of the wetland this community grades into a second freshwater wetland community, the Spiraea douglasii community. It is codominated by Carex sitchensis and is probably ecotonal between a freshwater and sphagnum bog community.

CONDITION: There is no apparent human disturbance of Cranberry Marsh #2. The uplands were all logged at one time but any effects of that operation are no longer visible.

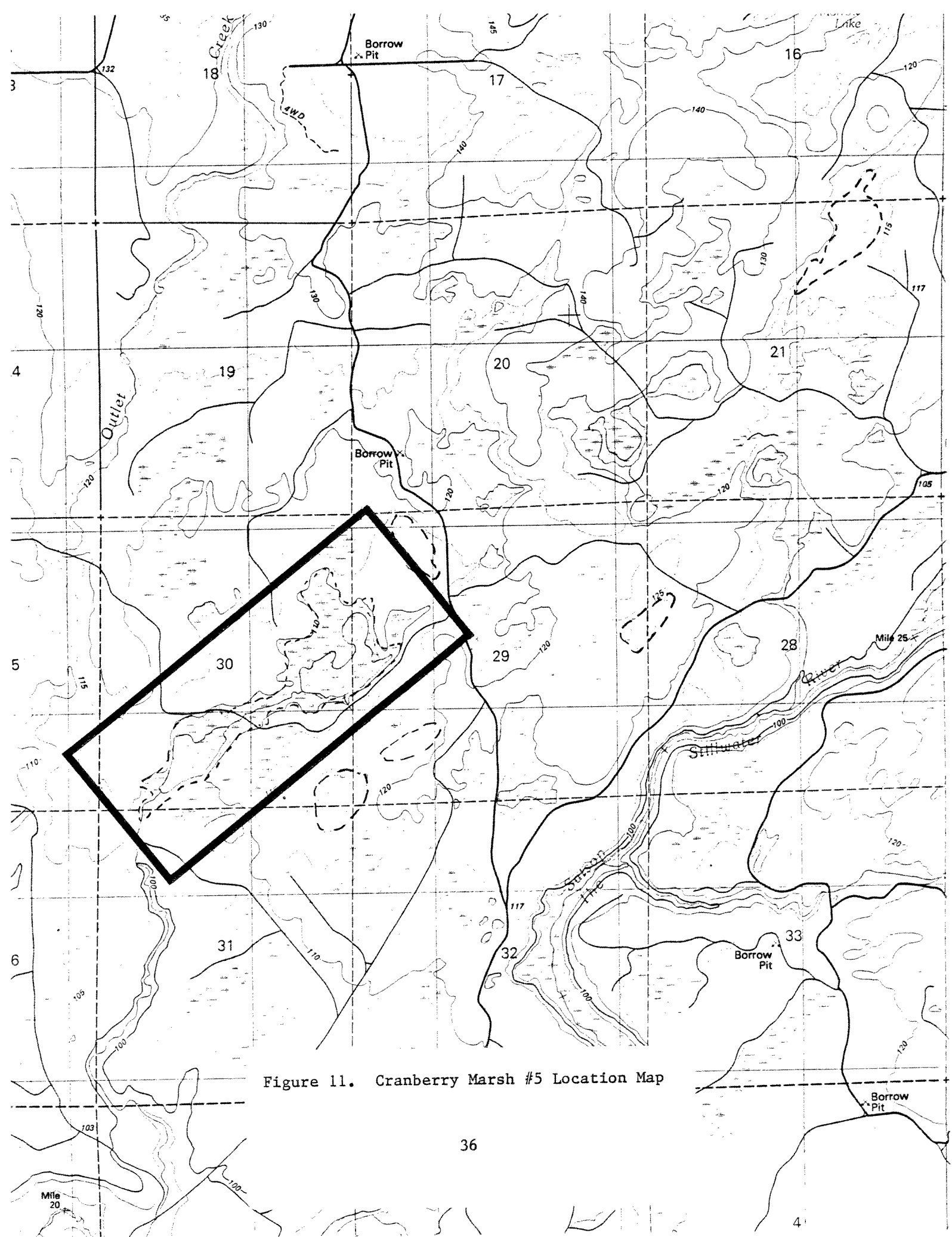


Figure 11. Cranberry Marsh #5 Location Map

CRANBERRY MARSH #5

LOCATION: Mason County; Sections 29 and 30, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Cranberry Marsh #5 is a first tier site. It contains 5 freshwater wetland communities.

FEATURES: Freshwater Wetland:

1. Tsuga heterophylla/Lysichitum americanum community
2. Carex spp. community
3. Cornus stolonifera-Salix spp.-Spiraea douglasii community
4. Salix spp. community
5. Thuja plicata community

DESCRIPTION:

Physical: Cranberry Marsh #5 is located at about 110 feet elevation on the interface between a rolling moraine and out-wash plain. It is about 78 acres which includes an impounded area with sphagnum and non-sphagnum soils, and a stream and riparian system.

The wetland is in a shallow basin that drains to the south into the East Fork Satsop River. The wetland receives water through a small seasonal stream flowing from the northeast, and surface flow. The stream flows along the south side of the wetland, becoming a relatively large, perennial stream midway through the wetland area.

The wetland soils form a mosaic. A large herb-dominated area has a mixture of fibrous, sphagnum, and heath peat. This area is permanently flooded with a few inches of water, to seasonally flooded and then supersaturated.

A shrub dominated area that is impounded has soft organic muck soils, probably with some fibrous and woody peat. It is permanently flooded with as much as 3 feet of water. Soils in the shrub dominated riparian area are probably similar though probably with a thinner layer of muck and peat.

Tree dominated impounded areas have peat soils primarily composed of evergreen needles and woody material but also heath and fibrous peat. The substrates are uneven with depressions, mounds, and large woody debris from wind thrown trees. These areas are seasonally flooded with the water table dropping to 1-2 feet below the soil surface.

Biological: The Carex spp. community is about 8 acres. The vegetation is an unusual mixture of sphagnum bog and freshwater wetland plant species. There are over 30 species of herbaceous

plants. Scirpus microcarpus and Carex phyllomanica are the most abundant species.

The Salix spp. community covers about 8 acres and is impounded. The vegetation is similar to the Carex spp. community except that there is a dense overstory of Salix spp. and Alnus cf rubra.

The Cornus stolonifera-Salix spp.-Spiraea douglasii community is found in the riparian zone and covers about 34 acres.

There are 2 forested freshwater wetland communities. The Thuja plicata community is about 7 acres and is dominated by scraggly Thuja plicata. The understory is dominated by Gaultheria shallon on mounds of soil and fallen trees, and a species rich assortment of shrubs and herbs in the lower, wetter areas. The Tsuga heterophylla/Lysichitum americanum community is about 9 acres. It is drier than the preceding community and has a dense overstory of Tsuga heterophylla and Thuja plicata. The understory is primarily dense Gaultheria shallon with Lysichitum americanum in holes from root wads of fallen trees.

CONDITION: Cranberry Marsh #5 appears to have very little human disturbance. A narrow portion of the stream and riparian system is crossed by a logging road on a bridge. All of the adjacent uplands have been logged in the past and no buffers were retained. It appears that some of the trees in the wetland near the uplands were burned, but no logging appears to have taken place in the wetland.

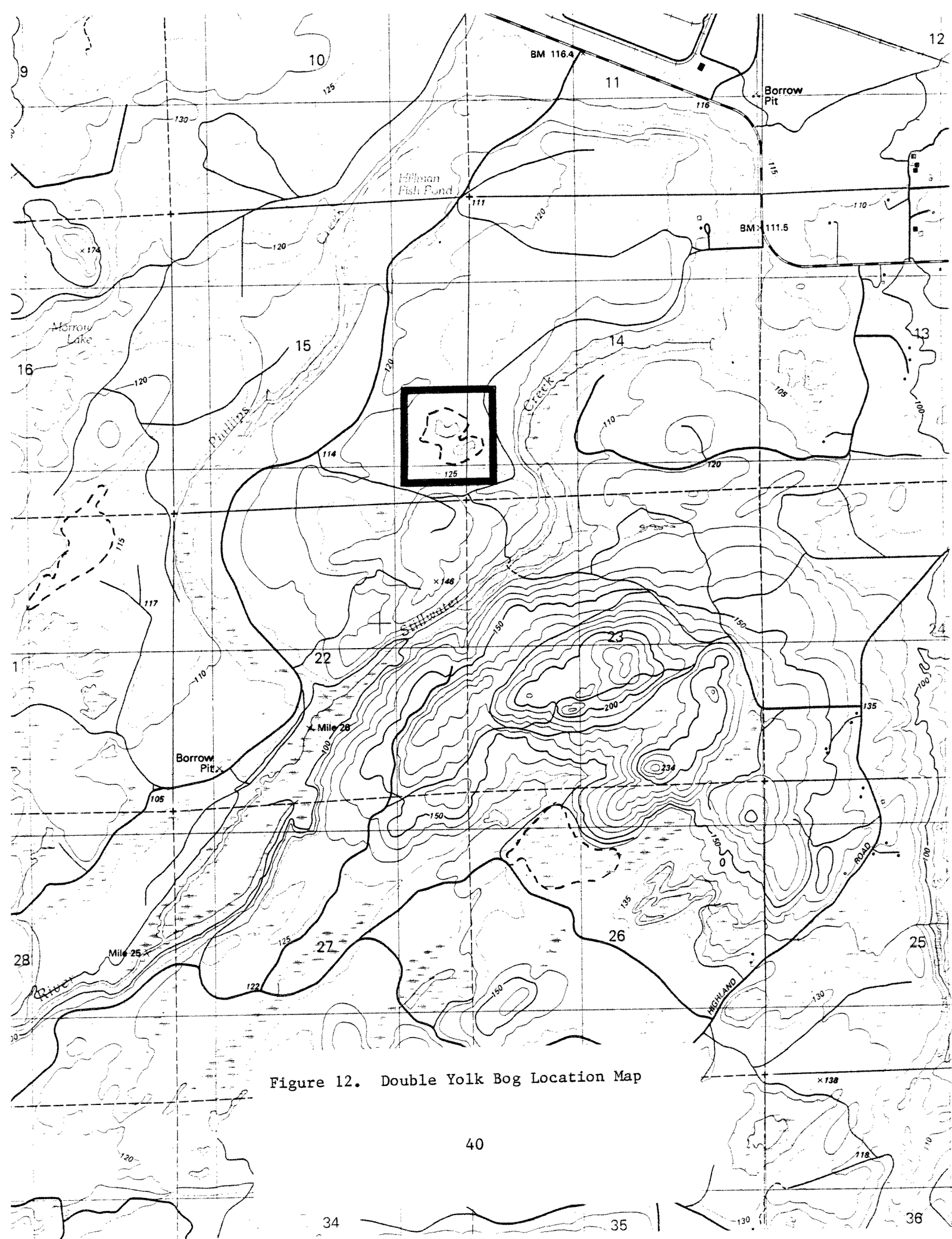


Figure 12. Double Yolk Bog Location Map

DOUBLE YOLK BOG

LOCATION: Mason County; Sections 14 and 15, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Double Yolk Bog is a first tier site. It contains 1 sphagnum bog community and 4 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Spiraea douglasii/Sphagnum spp. community

Freshwater Wetland:

1. pond
2. Nuphar polysepalum community
3. Spiraea douglasii community
4. Pyrus fusca community

DESCRIPTION:

Physical: Double Yolk Bog is a 12 acre wetland located at 125 feet elevation on a rolling moraine. It is dumb-bell shaped. The wetland has no apparent inflow or outflow channel.

In the center of each end of the wetland is a shallow permanent to semi-permanent pond which has sloping sides. The ponds total about 2.5 acres. The water level in the ponds seems to have an annual fluctuation of about 3 feet.

The ponds are surrounded by terraces raised about 1 foot above the adjacent pond bottom. The terrace soils are wet and may be seasonally inundated. Landward of the terraces, the wetland is seasonally to semi-permanently flooded.

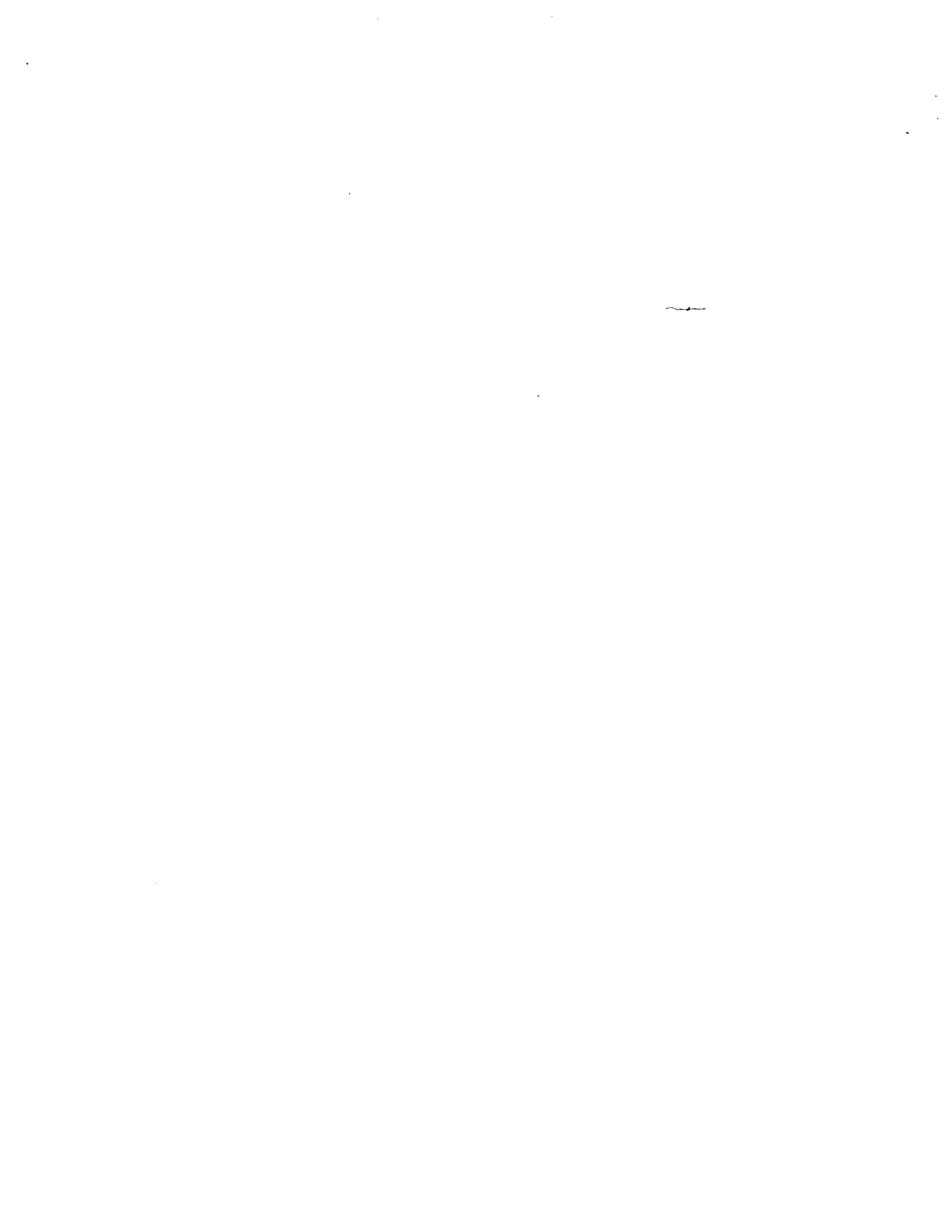
The pond substrates are muck and fibrous peat. The terrace substrates are a mixture of sphagnum, fibrous, and heath peat. The sphagnum peat is found mostly in the upper 6 inches of the terrace. Landward of the terrace, the wetland substrate is glacial till with very little organic matter.

Biological: The sphagnum bog is a good example of a Spiraea douglasii/Sphagnum spp. community. It is 4.5 acres. The associated sedge is Carex obnupta and there is an unusually high percent cover of Nuphar polysepalum.

Several emergent and a few rooted aquatic plant species occur in the ponds. The primary species is Nuphar polysepalum, with Dulichium arundinaceum, Carex sitchensis, Carex vesicaria, and Juncus balticus also prominent.

A discontinuous zone of tall, dense, freshwater Spiraea douglasii occurs around, and slightly lower than, the outer margin of the sphagnum terrace. It grades into a drier Pyrus fusca thicket that has high cover of Salix spp. Together, these 2 freshwater wetland communities are about 5 acres.

CONDITION: Double Yolk Bog has no apparent human disturbance. The uplands were all logged at one time and no buffer was retained. Any effects of logging on the wetland are no longer apparent.



ELBOW LAKE

LOCATION: Thurston County; Section 32, Township 16 North, Range 3 East, Willamette Meridian.

SIGNIFICANCE: Elbow Lake is a first tier site. It contains 2 freshwater wetland communities and a sensitive plant species.

FEATURES: Freshwater Wetland:
1. Typha latifolia community
2. Carex cusickii community

Special Species:
1 sensitive plant species

DESCRIPTION:

Physical: Elbow Lake is located at 500 feet elevation at the foot of the Cascade Mountains. It occurs in rough topography in glacial drift. The lake appears to have no inflow channel, but it has an outflow channel which drains to the northeast into the Nisqually River.

The area of interest is about 8 acres, and lies in the shallow southern lobe of Elbow Lake. The lake bottom soils are organic muck and probably fibrous peat. The Carex cusickii community occurs on floating islands mostly composed of fibrous peat.

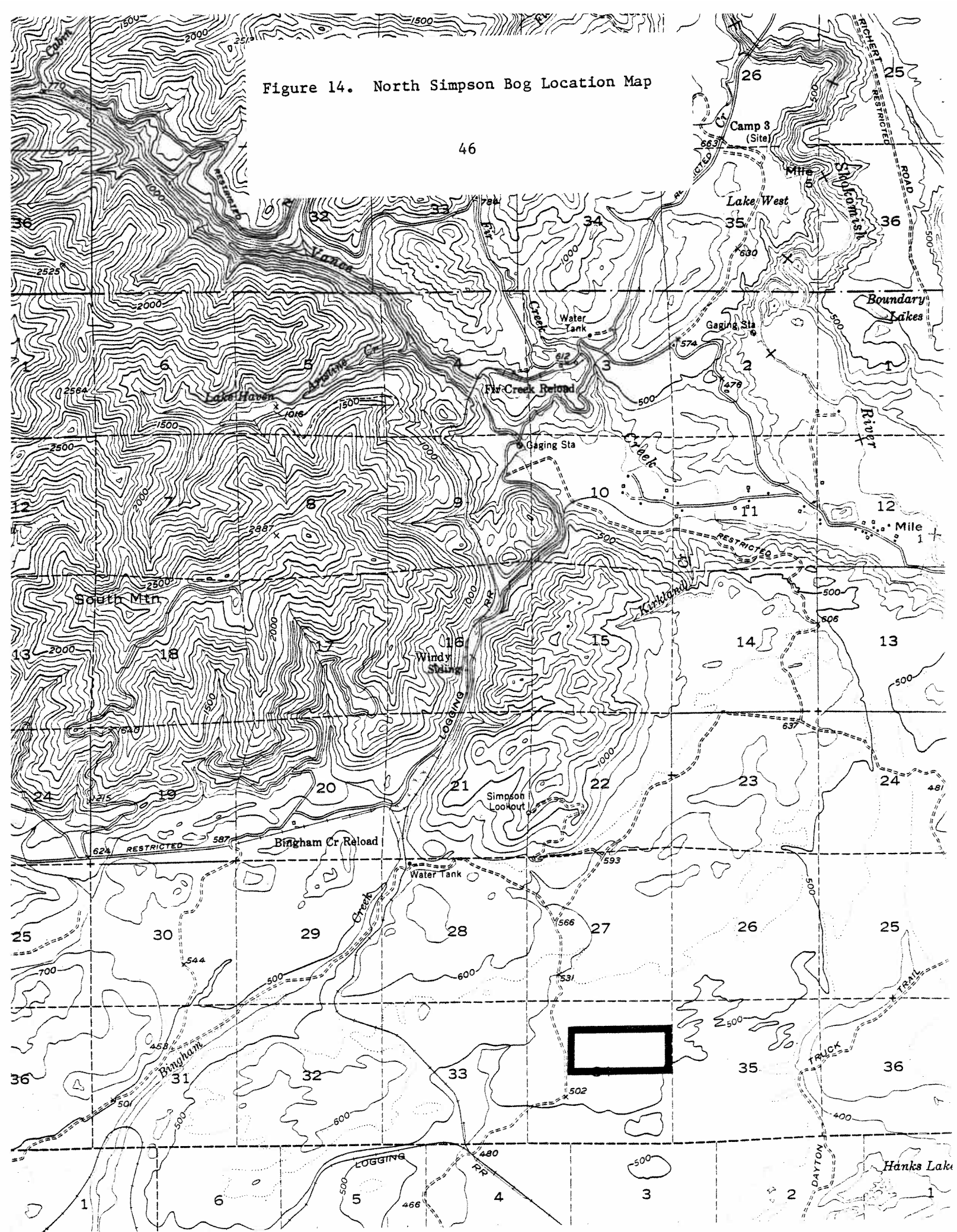
Biological: The Carex cusickii and Typha latifolia communities grow intermixed. The Typha latifolia community is monospecific and arises from the lake bottom. The Carex cusickii community is species rich, and occurs as quaking islands of fibrous peat.

CONDITION: The wetland vegetation appears to be in excellent condition. The only sign of possible disturbance is the existence of snags within the wetland indicating a past change in water level. This may have been a natural or human caused alteration.

There is recreational use made of Elbow Lake, but most occurs at the north end of the lake. There is a little use of the southern lobe by anglers and probably hunters. There are remains of a cabin on the shore near the wetland. All of the uplands have been logged.

Figure 14. North Simpson Bog Location Map

46



NORTH SIMPSON BOG

LOCATION: Mason County; Section 34, Township 21 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: North Simpson Bog is a first tier site. It contains 1 sphagnum bog community and 3 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Spiraea douglasii/Sphagnum spp. community

Freshwater Wetland:

1. pond
2. Nuphar polysepalum community
3. Dulichium arundinaceum community

DESCRIPTION:

Physical: North Simpson Bog is an 11 acre wetland located at about 500 feet elevation in a gravelly outwash plain. It has no channeled inflow, and has a seasonal outflow south into Nahwatzel Lake.

The wetland is oblong, oriented east and west. A 1.6 acre semipermanent pond occupies the center of the wetland. Soils are soft, black, organic muck and fibrous peat. Surrounding the pond is a terrace which is a mixture of sphagnum, fibrous, and heath peat. The wetland soils are very shallow, probably less than 3 feet deep.

Biological: The sphagnum bog community is a typical example of a Spiraea douglasii/Sphagnum spp. community. The primary sedge associated with this site is Carex obnupta. The cover of sphagnum moss is only about 50%.

The pond is about 25-30% non-vegetated, very shallow water. The remainder is a mixture of Nuphar polysepalum and Dulichium arundinaceum communities with some Scirpus subterminalis and Carex vesicaria. The vegetated area is mostly seasonally flooded.

CONDITION: The wetland appears to be undisturbed by humans. The uplands were all logged at one time and no buffer was retained. This probably had some effect on the wetland, but the length of time since cutting has obscured any effects.

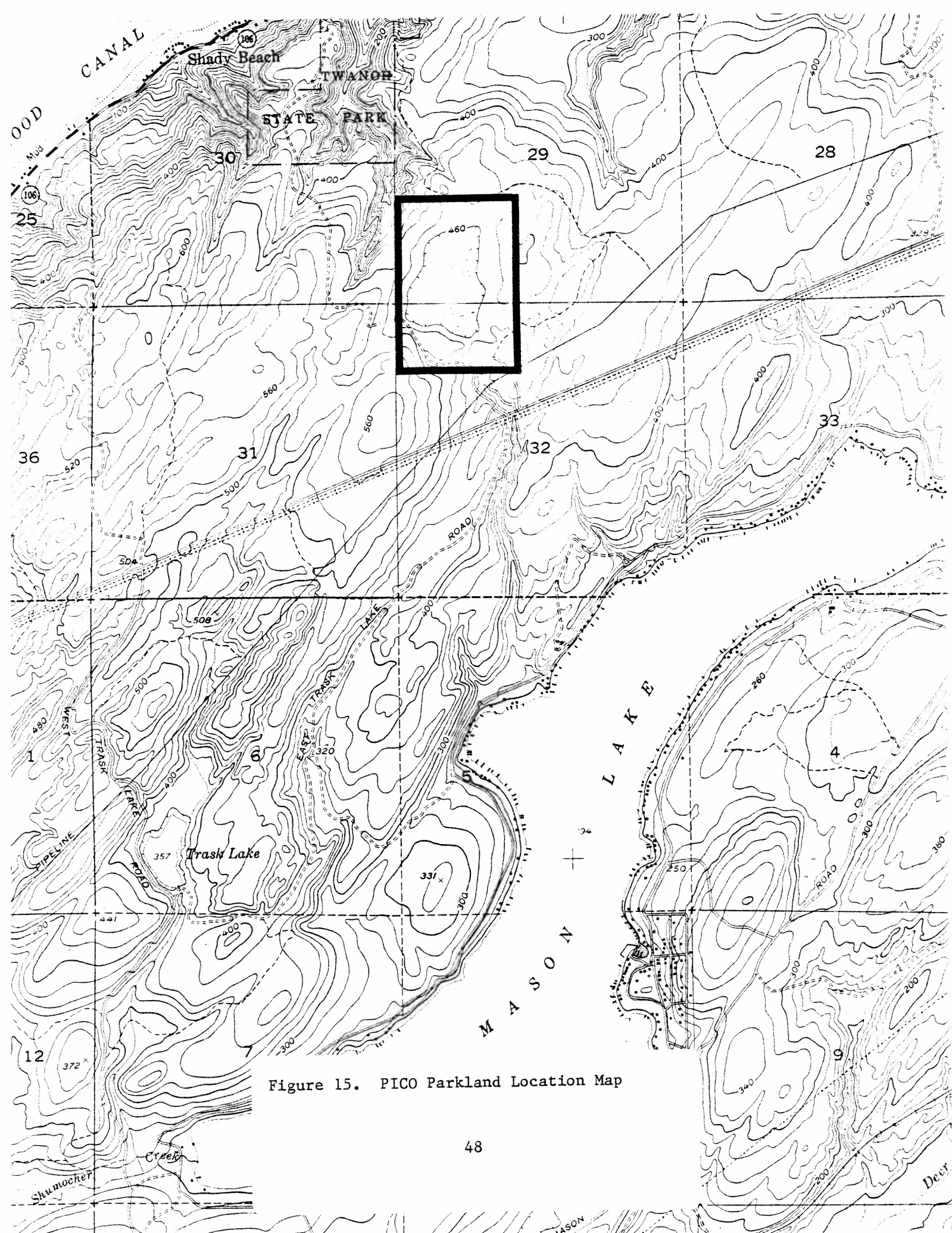


Figure 15. PICO Parkland Location Map

PICO PARKLAND

LOCATION: Mason County; Sections 29 and 32, Township 22 North, Range 2 West, Willamette Meridian.

SIGNIFICANCE: PICO Parkland is a first tier site containing 2 sphagnum bog community.

FEATURES: Sphagnum Bog:

1. Spiraea douglasii/Sphagnum spp. community
2. Pinus contorta/Ledum groenlandicum/Sphagnum spp. community

DESCRIPTION:

Physical: PICO Parkland is a 20 acre wetland located at 460 feet elevation on a moraine between Hood Canal and Mason Lake. The wetland's drainage basin is small and has a perched water table. The wetland is fed by surface flow and there is no outflow. Most of the wetland is seasonally flooded.

Soils are a mixture of sphagnum, fibrous, and heath peat. There is some woody material. Throughout most of the wetland, soils are 9 feet deep. In one area they are more than 13 feet deep. Wetland soils overlay a cemented clay layer.

Biological: PICO Parkland is an excellent example of a Spiraea douglasii/Sphagnum spp. community. It contains small examples of other communities typically associated with this kind of sphagnum bog, but primarily it is an open shrub bog dominated by Spiraea douglasii 2 1/2 to 3 feet tall, with Carex sitchensis and Gentiana sceptrum as indicator species.

A 1 acre Pinus contorta/Ledum groenlandicum/Sphagnum spp. community occurs as an island within the Spiraea douglasii/Sphagnum spp. community. It is slightly higher and drier than the surrounding wetland but the soils are deeper, > 13 feet.

CONDITION: The wetland appears to be undisturbed except for effects from logging on adjacent uplands. The uplands to the east and southwest of the wetland were recently logged. Buffers were not retained in either case, a few trees were felled into the wetland, and vehicles entered the wetland margin. A small area of the east side of the wetland was scorched by a recent slash-burn. No exotic plant species were observed in the wetland.

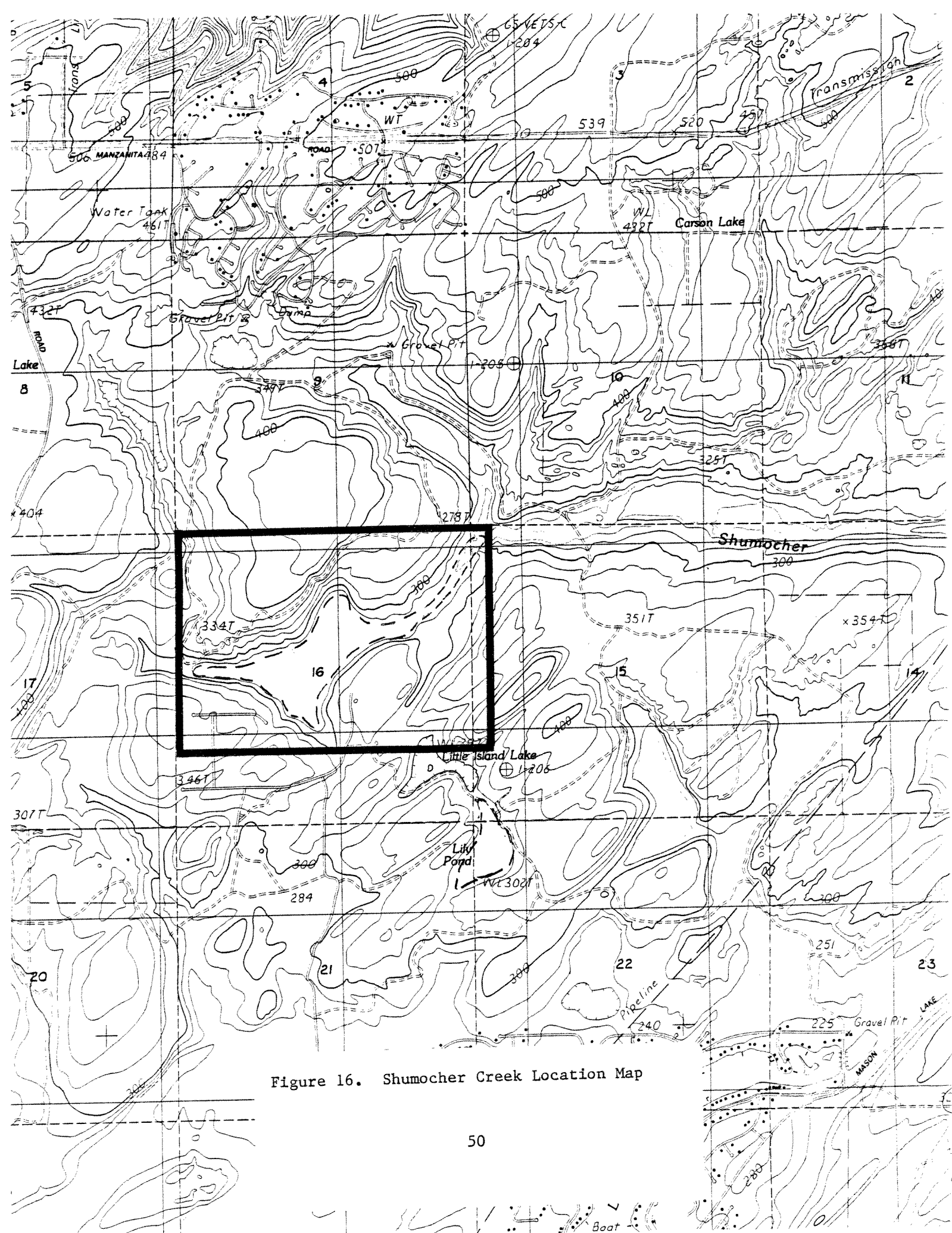


Figure 16. Shumocher Creek Location Map

SHUMOCHER CREEK

LOCATION: Mason County; Section 16, Township 21 North, Range 3 West, Willamette Meridian.

SIGNIFICANCE: Shumocher Creek is a first tier site. It consists of 1 sphagnum bog community and 1 freshwater wetland community. It also contains a high quality stream and riparian system.

FEATURES: Sphagnum Bog:

1. Pinus contorta/Ledum groenlandicum/Sphagnum spp. community

Freshwater Wetland:

1. Alnus sinuata community

DESCRIPTION:

Physical: Shumocher Creek is 74 acre wetland located between 260 and 300 feet elevation. It occurs in a glacial outwash channel surrounded by moraines.

The wetland arises from seeps at its west end. Water flows to the east through an area which is partially impounded by beaver dams. Beyond the dams, water flows to the east and north through a more defined stream and riparian system. The water level is fairly constant year-round, though the height of the beaver dams has raised the water level in the partially impounded area as much as 5 feet over a long period of time.

The wetland is underlain by gravel. The stream channel is gravelly-sandy-loam. The freshwater wetland areas have organic soils; organic muck with fibrous and woody peat in the partially impounded area, and a mosaic of sand, silt, and pockets of organic material downstream of the beaver dams. Within the partially impounded area are 27 acres of sphagnum bog. The soils are organic, approximately 11 feet of organic litter, sphagnum, fibrous, and woody peat.

Biological: The sphagnum bog is a bog forest dominated by Pinus contorta with a dense understory of Gaultheria shallon and Ledum groenlandicum. The cover of Sphagnum spp. varies from 20% to 100%.

The freshwater wetland community occurs in the partially impounded area. It has a dense shrub overstory dominated by Alnus sinuata, but also contains Spiraea douglasii, Salix spp., and Rhamnus purshiana. The understory is unusual by its lack of reed canarygrass (Phalaris arundinacea). It is dominated by Calamagrostis canadensis and Carex sitchensis.

There is a riparian zone downstream of the beaver dams which is dominated by Alnus rubra in the overstory, and Athyrium filix-femina and Carex obnupta in the understory. There is some Rubus spectabilis, Lysichitum americanum, Viola palustris, Tolmiea menziesii, and Oenanthe sarmentosa.

CONDITION: Shumocher Creek is in unusually good condition. The sphagnum bog has a few trees cut along a survey line but no other sign of human disturbance. Most of the stream and riparian system also appears undisturbed. An old logging road crosses the stream just east of the seeps and has partially impounded the wetland to the west. An area which is now impounded by beaver dams was upland at one time and was logged, the cut stumps are still visible. The uplands were all cut and most converted to Christmas tree farms. Some patches of old second growth were left adjacent to the wetland.

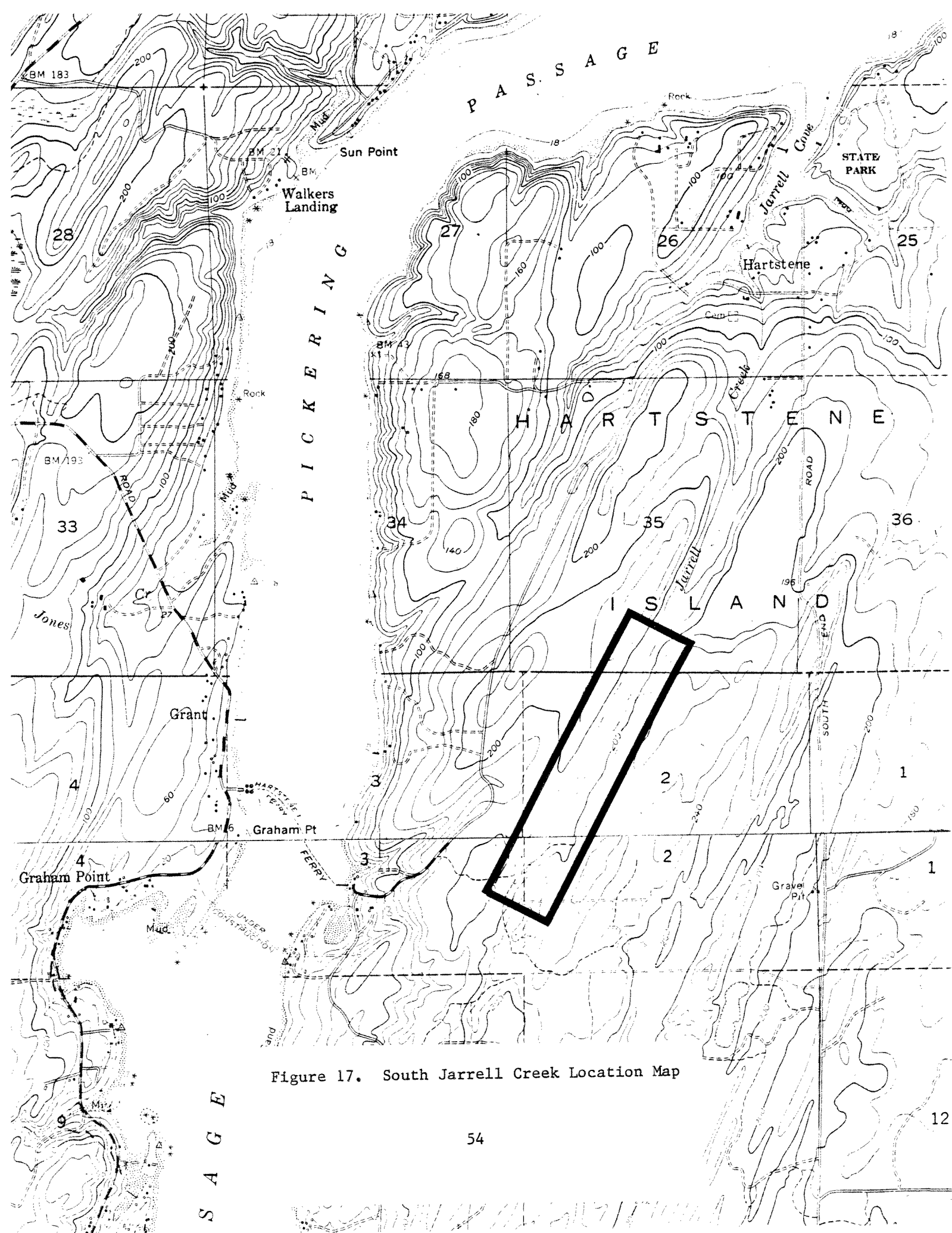


Figure 17. South Jarrell Creek Location Map

SOUTH JARRELL CREEK

LOCATION: Mason County; Section 2, Township 20 North, Range 2 West, Willamette Meridian.

SIGNIFICANCE: South Jarrell Creek is a first tier site. It contains 3 freshwater wetland communities and 1 sphagnum bog community.

FEATURES: Sphagnum Bog:

1. Spiraea douglasii/Sphagnum spp. community

Freshwater Wetland:

1. Nuphar polysepalum community
2. Scirpus subterminalis community
2. Dulichium arundinaceum community

DESCRIPTION:

Physical: South Jarrell Creek is a 21 acre wetland along approximately 3/4 miles of the Jarrell Creek drainage on Hartstene Island. It is located at an elevation of 180 feet on a rolling moraine, and is oriented northeast-southwest.

The Jarrell Creek drainage may be subsurface through this area. At the time of survey, there was no flowing water through the wetland.

The central area of the wetland is shallow, but probably permanently flooded. The soils are very soft, black, anoxic, organic muck.

Landward of the permanently flooded area is a zone that is seasonally flooded to supersaturated. The soils in this area are very soft, black, anoxic, organic muck.

The most landward zone of the wetland is a low terrace of sphagnum, fibrous, and heath peat that may be seasonally flooded. The wetland is probably no more than 3 feet deep with glacial till underlying it.

Biological: The sphagnum bog community occurs on the terraces adjacent to the upland. The bog is an example of the Spiraea douglasii/Sphagnum spp. community and has about 95% cover of Sphagnum spp. The only departure from a typical example of this community is the site's lack of Gentiana sceptrum.

The permanently flooded portion of the freshwater wetland is covered with rooted aquatic vegetation. The central area is dominated by Nuphar polysepalum community. Inland of that area are patches dominated by the Scirpus subterminalis community.

Throughout the permanently flooded area is dense cover of Utricularia vulgaris.

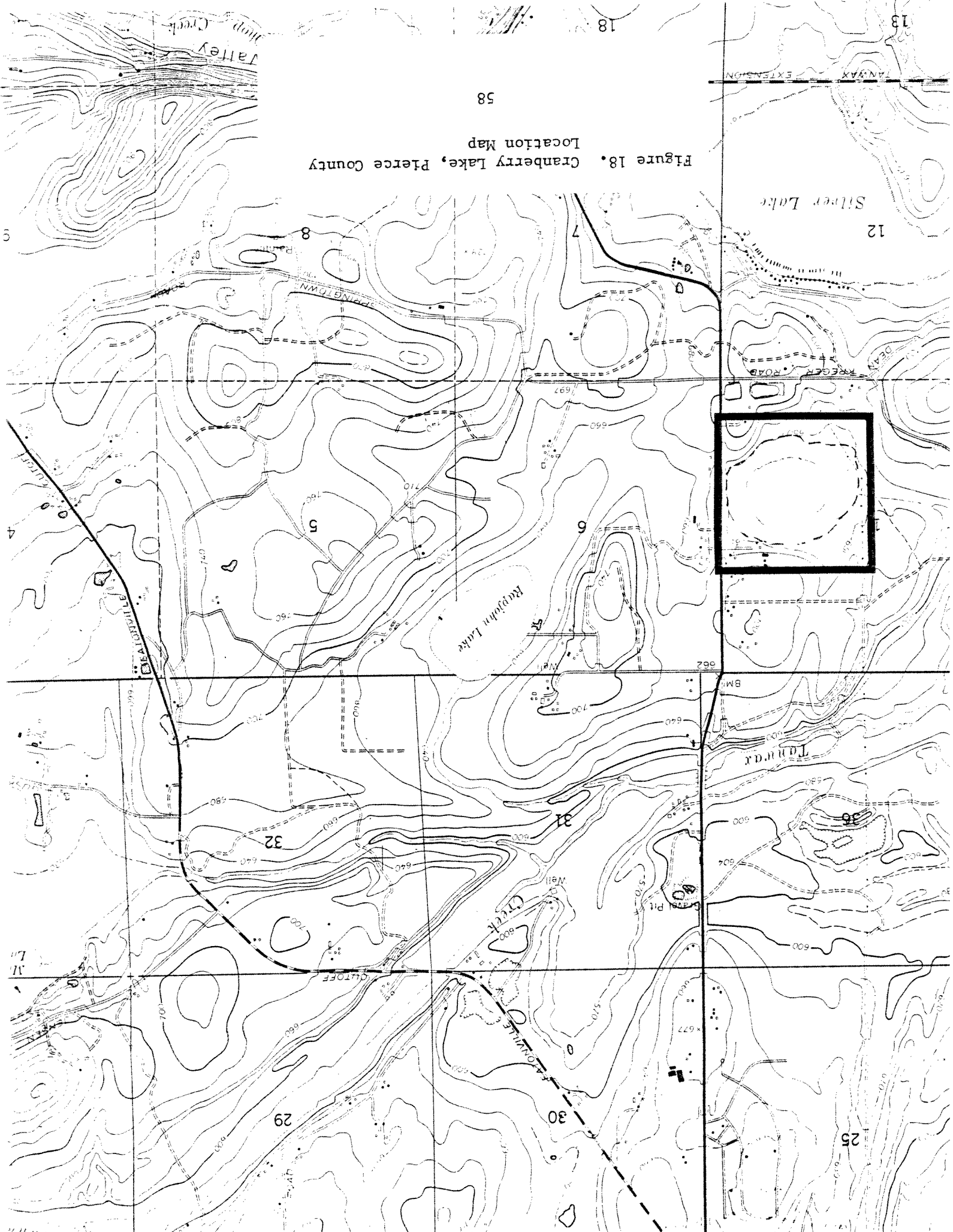
The seasonally flooded area is covered with the Dulichium arundinaceum community.

CONDITION: South Jarrell Creek is in excellent condition. The only apparent sign of disturbance is at the northeast end where the remains of a road or railroad are located across the wetland. What remains of the road is a narrow ridge covered with Spiraea douglasii.

SECOND TIER SITE DESCRIPTIONS

Figure 18. Cranberry Lake, Pierce County
Location Map

58



9

4

M.L.

1

12

13

18

25

29

30

31

32

35

Silver Lake

Knappton Lake

Valley Creek

TANNAK

DEAN ROAD

KREEGER ROAD

SPRINGTOWN



CRANBERRY LAKE, PIERCE COUNTY

LOCATION: Pierce County; Section 1, Township 16 North, Range 3 East, Willamette Meridian.

SIGNIFICANCE: Cranberry Lake is a second tier site. It has a long history of disturbance, but contains 2 sphagnum bog communities, a population of a plant species listed as threatened, and a population of a plant species listed as sensitive in Washington.

FEATURES: Sphagnum Bog:

1. Rhynchospora alba/Sphagnum spp. community
2. Ledum groenlandicum/Sphagnum spp. community

Special Species:

- 1 threatened plant species
- 1 sensitive plant species

DESCRIPTION:

Physical: Cranberry Lake is located at an elevation of 644 feet in a shallow basin within glacial till. Approximately 23 acres of sphagnum bog encircle a 23 acre lake. The bog soils are a mixture of sphagnum peat, fibrous peat, heath peat, and lake muck. The lake and wetland drain to the west into Tanwax Creek.

Biological: The sphagnum bog communities have an unusually large number of plant species, many of which are exotic. An example of the Rhynchospora alba/Sphagnum spp. community occurs along the lake margin, mostly on the north side of the lake, on a floating sphagnum mat. Inland of this community, on firmer sphagnum, is an example of the tall form of the Ledum groenlandicum/Sphagnum spp. community. This community is codominated by L. groenlandicum and Spiraea douglasii and is probably a mixture of the L. groenlandicum/Sphagnum spp. and Spiraea douglasii/Sphagnum spp. communities. It progresses inland into a second growth shrub thicket dominated by Betula glandulosum and Spiraea douglasii.

CONDITION: The Cranberry Lake vegetation is in good condition considering its history of land use. But most important are the populations of the threatened and sensitive plant species which occur there.

The outflow has been alternately dredged and blocked, draining and flooding the wetland respectively. It was cleared for pasture, trampled by cattle, and harvested for hay, among other uses. The outer margin of the wetland extends beyond the area described here but is still mown for hay. There are three

trails to the lake edge, each maintained by a different landowner.

A large number of exotic plant species are well established at the site, some of which are quite aggressive and may pose a problem in maintenance of the native vegetation.

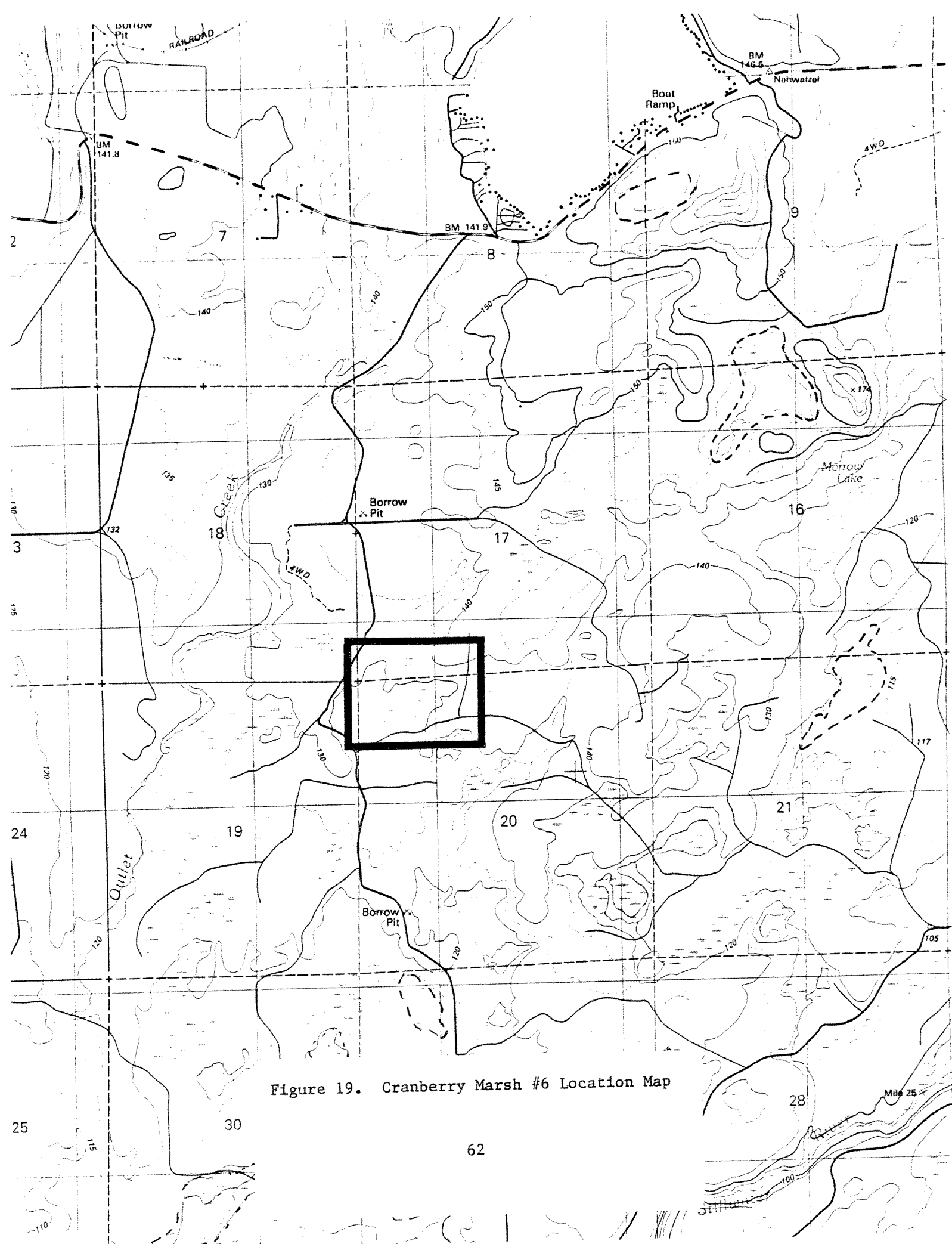


Figure 19. Cranberry Marsh #6 Location Map

CRANBERRY MARSH #6

LOCATION: Mason County; Section 20, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Cranberry Marsh #6 is a second tier site. It consists of 2 kettle wetlands, one contains 2 freshwater wetland communities and the second contains 2 sphagnum bog communities.

FEATURES: Sphagnum Bog:

1. Ledum groenlandicum/Sphagnum spp. community
2. Spiraea douglasii/Sphagnum spp. community

Freshwater Wetland:

1. Spiraea douglasii community
2. Pyrus fusca community

DESCRIPTION:

Physical: Cranberry Marsh #6 is located at 130 feet elevation on a rolling moraine. It consists of 2 kettle wetlands separated by a narrow ridge. There are no apparent inflow or outflow channels.

The largest kettle is about 7 acres. It has fibrous and heath peat soils, and is permanently flooded. The smaller kettle is about 2.5 acres. It has sphagnum and heath peat soils with woody material, and is seasonally flooded.

Biological: The kettle with sphagnum soils is predominantly an example of the tall form of the Ledum groenlandicum/Sphagnum spp. community. To the south, this community intermixes with a small example of a Spiraea douglasii/Sphagnum spp. community. Small Thuja plicata occur throughout the bog.

The larger kettle is primarily a dense freshwater Spiraea douglasii community. Around the margin of the kettle is a Pyrus fusca community with high cover of Rhamnus purshiana and Carex obnupta.

CONDITION: The 2 kettles are small but in relatively good condition. The larger kettle had a road across it at one time. The road is still visible on the aerial photos but difficult to locate on the ground. The uplands were logged at one time and no buffer was retained.

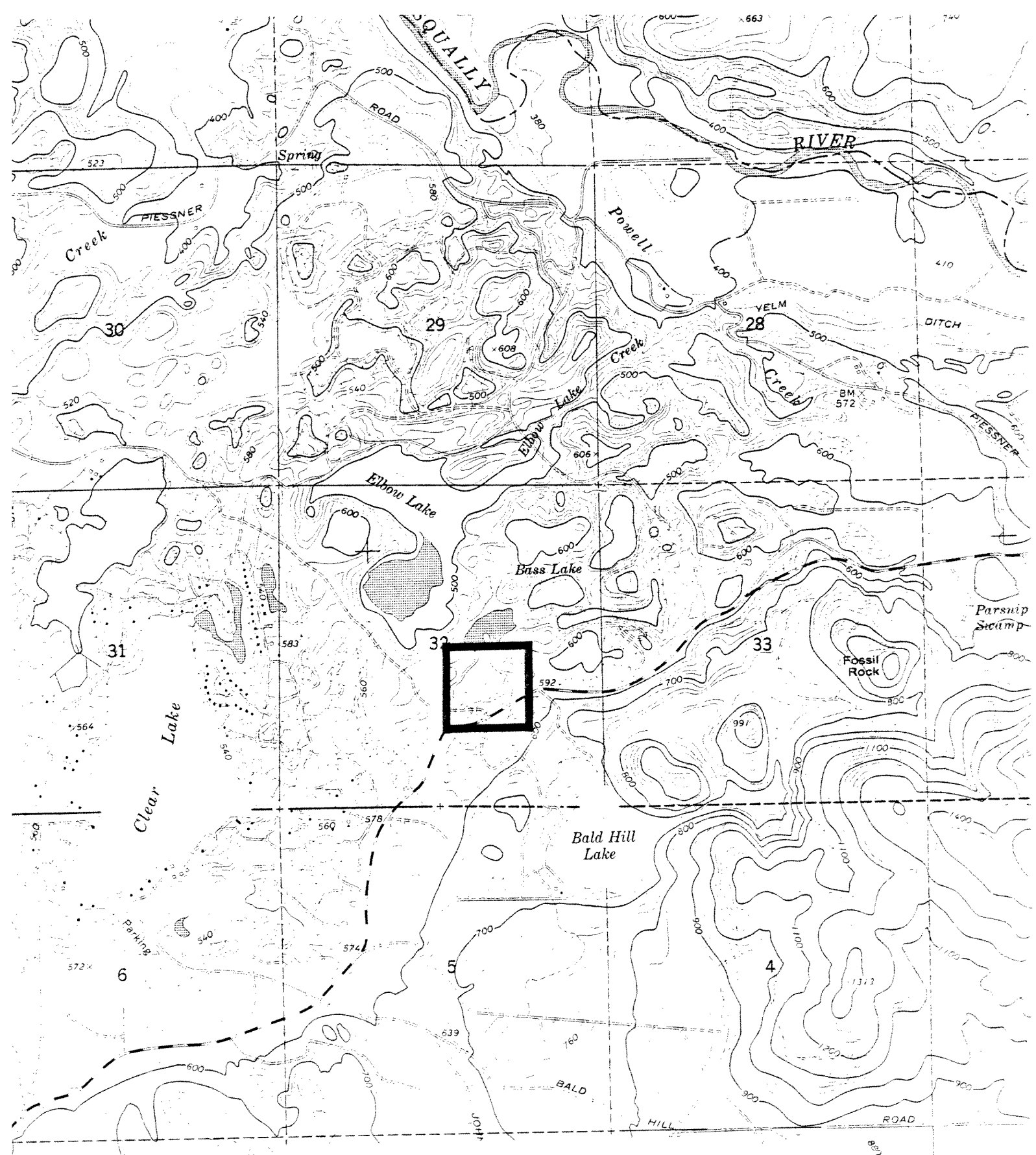
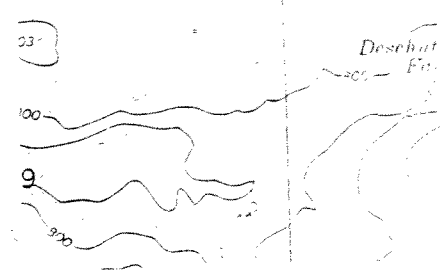


Figure 20. Elbow Lake #5 Location Map



ELBOW LAKE #5

LOCATION: Thurston County; Section 32, Township 16 North, Range 3 East, Willamette Meridian.

SIGNIFICANCE: Elbow Lake #5 is a second tier site which contains 2 freshwater wetland communities.

FEATURES: Freshwater Wetlands:

1. Typha latifolia community
2. Glyceria elata community

DESCRIPTION:

Physical: Elbow Lake #5 is a 4 acre wetland located at 540 feet elevation near the foothills of the Cascade Mountains. It occurs in glacial drift between the Nisqually and Deschutes Rivers.

Elbow Lake #5 is probably a kettle wetland. The wetland slopes are steep and composed of sand, cobble, and gravel. The wetland has no apparent inflow or outflow channels.

The wetland is composed of 2 distinct areas, one is a seasonally flooded basin with organic muck soils and large woody material. The second is a raised area with seeps and super-saturated soils, but is probably never flooded.

Biological: The wetland basin is sparsely vegetated by emergent plant species, primarily Glyceria elata.

The raised wetland area is complex, probably a small scale mosaic of several wetland plant communities. Typha latifolia, Oenanthe sarmentosa, Potentilla palustris, Spiraea douglasii and Lysichitum americanum are the predominant species.

CONDITION: Elbow Lake #5 is in relatively good condition. Reed canarygrass (Phalaris arundinacea) only occurs along a portion of the upland margin. The uplands have been logged and no buffer was left. There are no visible trails to the wetland and access is difficult, suggesting that it receives minimal human use.

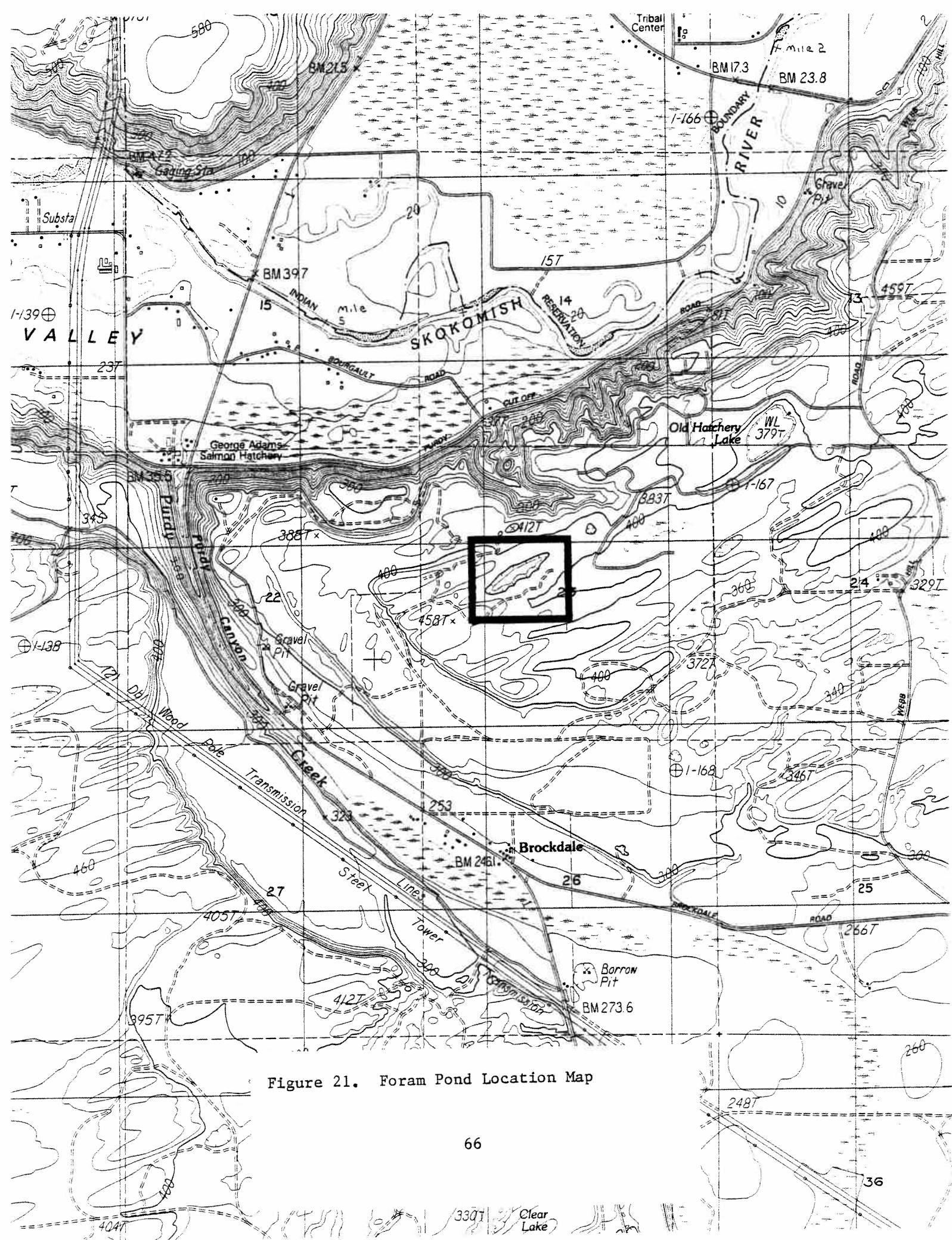


Figure 21. Foram Pond Location Map

FORAM POND

LOCATION: Mason County; Section 23, Township 21 North, Range 4 West, Willamette Meridian.

SIGNIFICANCE: Foram Pond is a second tier site which contains 1 sphagnum bog community and 3 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Spiraea douglasii/Sphagnum spp. community

Freshwater Wetland:

1. pond
2. Nuphar polysepalum community
3. Scirpus subterminalis community

DESCRIPTION:

Physical: Foram Pond is located at 400 feet elevation on a northeast-southwest oriented moraine. The wetland is oblong, about 1,500 feet long. It has no apparent inflow or outflow channel.

The wetland progresses from a shallow permanent pond in its center, to a zone which is seasonally to permanently flooded and has very soft organic muck soils. Inland from this zone is a low terrace of sphagnum, fibrous, and heath peat that is seasonally flooded. The wetland basin is probably quite shallow and is underlain by glacial till.

Biological: The sphagnum bog community occurs on the terrace around the wetland perimeter. The Spiraea douglasii/Sphagnum spp. community has unusually tall Spiraea douglasii and has few other plant species. There are a few Pinus contorta scattered through the bog. Associated with the pines are open areas dominated by sedges which appear to receive a high level of use by wildlife.

The seasonally to permanently flooded zone of the pond has a mixture of the Nuphar polysepalum and Scirpus subterminalis communities.

CONDITION: The wetland appears to have had very little disturbance. However, the wetland is small and an area adjacent to it is being prepared as a homesite. The forest around Foram Pond is pole sized second growth. Any effects of logging on the wetland are no longer apparent.

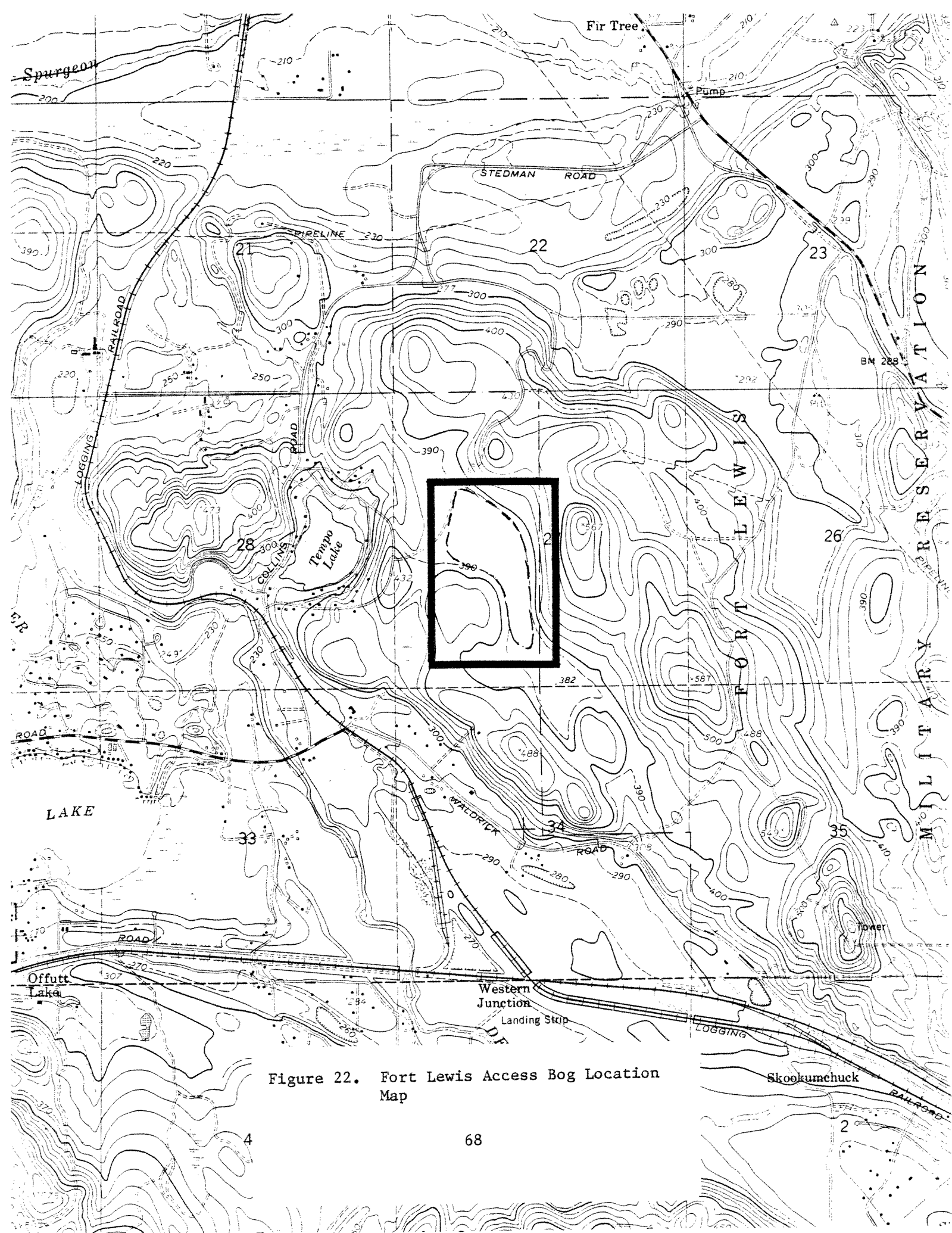


Figure 22. Fort Lewis Access Bog Location Map

FORT LEWIS ACCESS BOG

LOCATION: Thurston County; Section 27, Township 17 North, Range 1 West, Willamette Meridian.

SIGNIFICANCE: Fort Lewis Access Bog is a second tier site. It contains 3 sphagnum bog communities, and 2 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community
2. Ledum groenlandicum/Sphagnum spp. community
3. Pinus contorta/Ledum groenlandicum/Sphagnum spp. community

Freshwater Wetland:

1. Fraxinus latifolia community
2. Pyrus fusca community

DESCRIPTION:

Physical: Fort Lewis Access Bog is a 44 acre wetland located at 390 feet elevation on glacial drift. The wetland has no apparent channeled inflow or outflow.

The soils in the area are mapped as gravelly loams. The bog soils are a mixture of sphagnum peat, fibrous peat, heath peat, and woody material. The freshwater wetland area probably has a mixture of muck, fibrous peat, and woody material.

Biological: The sphagnum bog area is 14 acres. A small eyelet bog pond is located at its center. The pond is filling in and is vegetated with Nuphar polysepalum, Nymphaea odoratum, Potentilla palustris and Utricularia vulgaris. Around the pond is a quaking bog with a mixture of the Kalmia occidentalis/Sphagnum spp. community and the low growth form of the Ledum groenlandicum/Sphagnum spp. community. Most of the bog is a dry Pinus contorta/Ledum groenlandicum/Sphagnum spp. community.

The bog is ringed by a 30 acre freshwater wetland. Adjacent to the bog is an ecotonal zone dominated by Pyrus fusca and Ledum groenlandicum. This shifts landward to a Pyrus fusca community with Spiraea douglasii, and then a Fraxinus latifolia community with Carex sitchensis and Spiraea douglasii as the primary understory species. The ecotonal zone is dry while the rest of the freshwater wetland is supersaturated.

CONDITION: The wetland is in relatively good condition. The pond has had Nymphaea odoratum introduced into it. There are remnants of barbed wire fences to the west and east of the pond and quaking bog suggesting that livestock grazed in the area. Portions of the Pinus contorta/Ledum groenlandicum/Sphagnum

spp. community and the ecotonal area are trampled, but this is probably caused by deer.

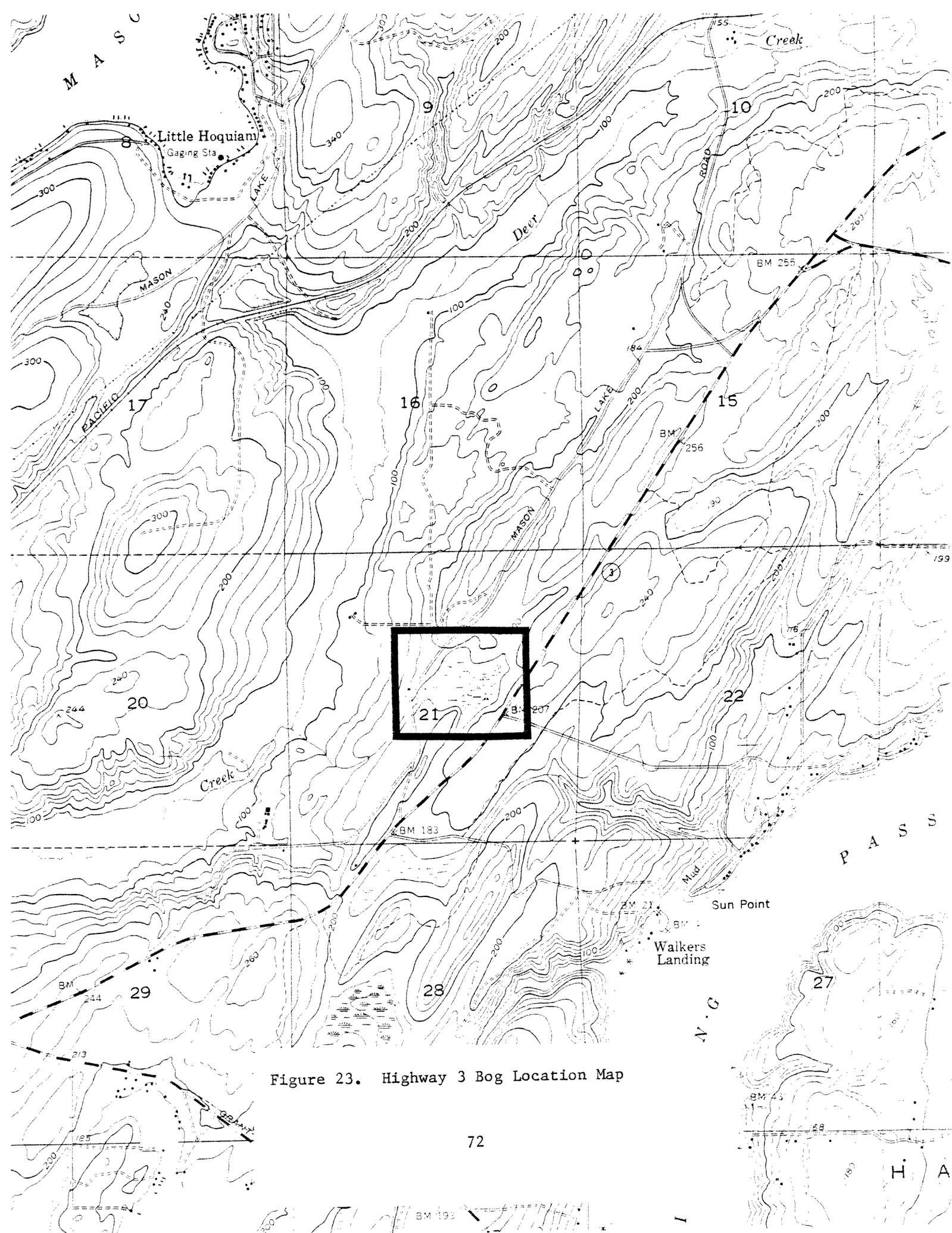


Figure 23. Highway 3 Bog Location Map

HIGHWAY 3 BOG

LOCATION: Mason County; Section 21, Township 21 North, Range 2 West, Willamette Meridian.

SIGNIFICANCE: Highway 3 bog is a second tier site and has one sphagnum bog community.

FEATURES: Sphagnum Bog:

1. Spiraea douglasii/Sphagnum spp. community

DESCRIPTION:

Physical: Highway 3 Bog is a 17 acre wetland located at 180 feet elevation on a northeast-southwest oriented moraine. It is the headwaters of a short creek which drains to the southwest into Deer Creek.

The bog soils are mostly a mixture of sphagnum, fibrous, and heath peat. There is 100% cover of Sphagnum spp. over most of the wetland surface. The soils are wet to seasonally flooded. Around the wetland margin soils are permanently flooded fibrous and heath peat with muck. In small seasonal to permanent ponds within the wetland the soils are fibrous peat and muck.

Biological: Highway 3 Bog is primarily a Spiraea douglasii/Sphagnum spp. community. However, throughout the wetland are small seasonal to permanent ponds with sphagnum moss and peat which are dominated by Juncus balticus, Nuphar polysepalum, or Carex sitchensis. Around the bog margin is a zone of freshwater wetland dominated by tall, dense Spiraea douglasii with no apparent sphagnum moss or peat. This zone is small and has been disturbed in places so it is not considered an occurrence of the Spiraea douglasii freshwater wetland community.

CONDITION: The sphagnum bog portion of the wetland appears in excellent condition. The southern arm of the wetland, which is a dense stand of Spiraea douglasii, is crossed by a logging road or railroad. The roadway was constructed of whole logs which are deteriorating and falling into the wetland. There are some areas adjacent to the roadway which were dredged. There is an abundance of dead Spiraea douglasii stems in this area suggesting that the water level has been altered.

The wetland outlet is crossed by the Mason Lake Road and is adjacent to a home and out buildings. The effects of the road or home on the wetland are not known.

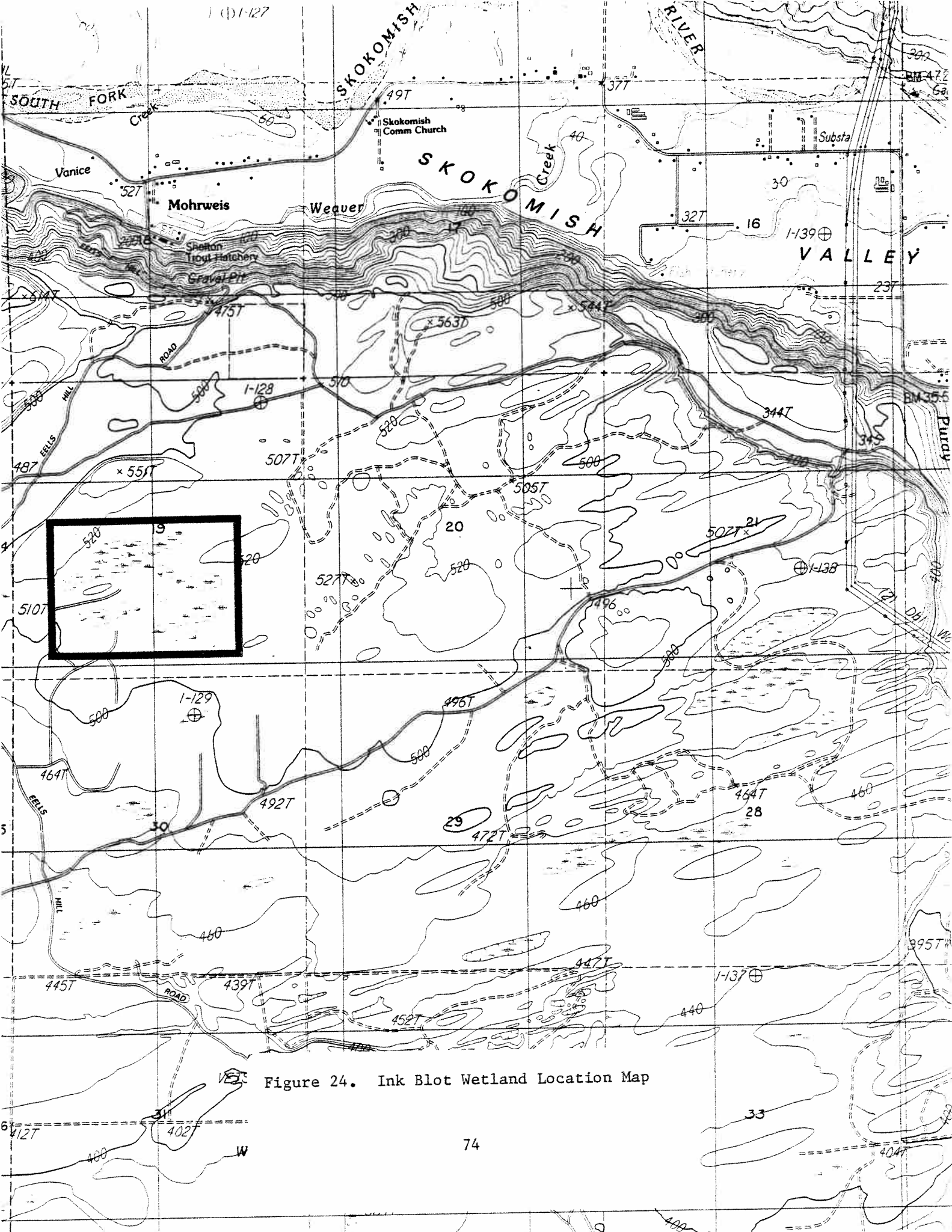


Figure 24. Ink Blot Wetland Location Map

INK BLOT WETLAND

LOCATION: Mason County; Section 19, Township 21 North, Range 4 West, Willamette Meridian.

SIGNIFICANCE: Ink Blot Wetland is a second tier site. It contains 1 sphagnum bog community and 5 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Spiraea douglasii/Sphagnum spp. community

Freshwater Wetland:

1. Nuphar polysepalum community
2. Scirpus subterminalis community
3. Carex vesicaria community
4. Dulichium arundinaceum community
5. Spiraea douglasii community

DESCRIPTION:

Physical: Ink Blot Wetland is located at 480 feet elevation on a rolling moraine. It is 33 acres, composed of three parallel wetlands, oriented northeast-southwest. Each wetland has several gravel bars extending into it which are perpendicular to the wetland axis. There are no apparent inflow or outflow channels.

Each wetland is composed of seasonal to permanent ponds surrounded by terraces elevated about 3 feet above the pond surfaces. The ponds have soft organic muck soils. The terraces are composed of sphagnum, fibrous, and heath peat. The terraces are wet but probably never flooded.

Around the outer wetland margin are seasonally flooded shrub wetlands. Some of these have fibrous and heath peat soils, but the soils are thin, overlaying glacial till.

Biological: The Spiraea douglasii/Sphagnum spp. community occupies the terraces. It is a typical example of this community and is found mostly in the northwestern of the three wetlands.

The ponds in the three wetlands differ in their vegetation. The northwestern wetland ponds have a mixture of the Nuphar polysepalum and Scirpus subterminalis communities in the deepest areas. Inland of those areas is a seasonally flooded zone with Dulichium arundinaceum. The middle wetland pond has an example of the Nuphar polysepalum community in the deepest areas. The shallower portions of the pond have the Carex vesicaria community. The southeastern wetland pond also has Nuphar polysepalum in the deepest areas. This is surrounded by

a mixture of Carex vesicaria and Dulichium arundinaceum communities.

The Spiraea douglasii community occupies low, seasonally flooded areas that do not have sphagnum soils. The middle and southeastern wetlands are primarily composed of this community.

CONDITION: The wetlands are in relatively good condition, having recovered well from past disturbances. Roads were once built along some of the gravel bars in the northwestern wetland. They are not apparent now but are visible in 1965 aerial photographs. The middle wetland had a road built through it which is still apparent and has revegetated with native species. The 1965 photographs show a ditch or road system which runs the full length of the middle wetland. It is no longer apparent in the field. The southeastern wetland appears to be undisturbed.

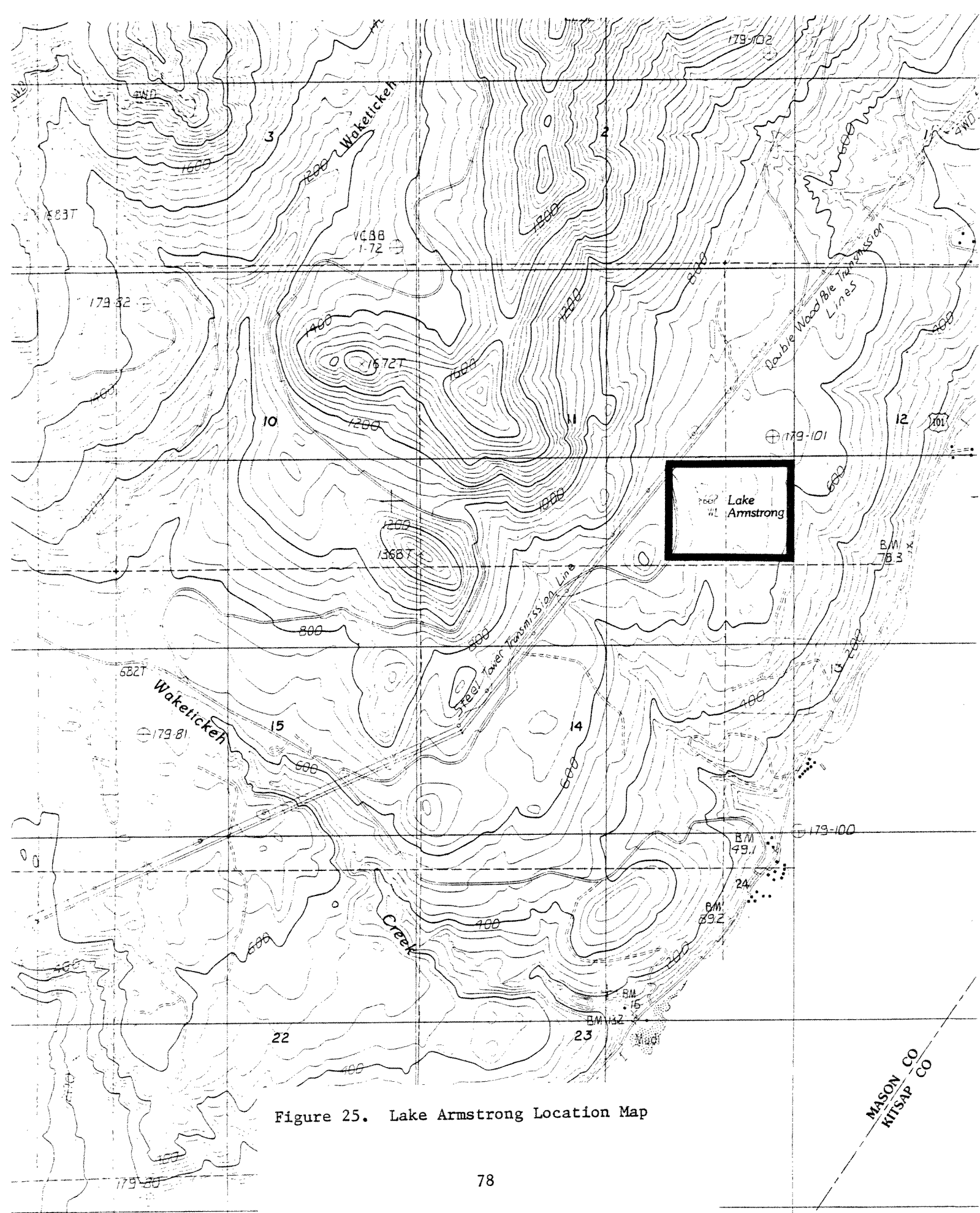


Figure 25. Lake Armstrong Location Map

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LAKE ARMSTRONG

LOCATION: Mason County; Section 11, Township 24 North, Range 3 West, Willamette Meridian.

SIGNIFICANCE: Lake Armstrong is a second tier site. It contains a small lake and 3 freshwater wetland communities.

FEATURES: Freshwater Wetland:

1. Carex vesicaria community
2. Spiraea douglasii community
3. Pyrus fusca community

DESCRIPTION:

Physical: Lake Armstrong is an 11 acre lake and wetland located at 662 feet elevation on a small plateau on the east side of the Olympic Mountains, above Hood Canal.

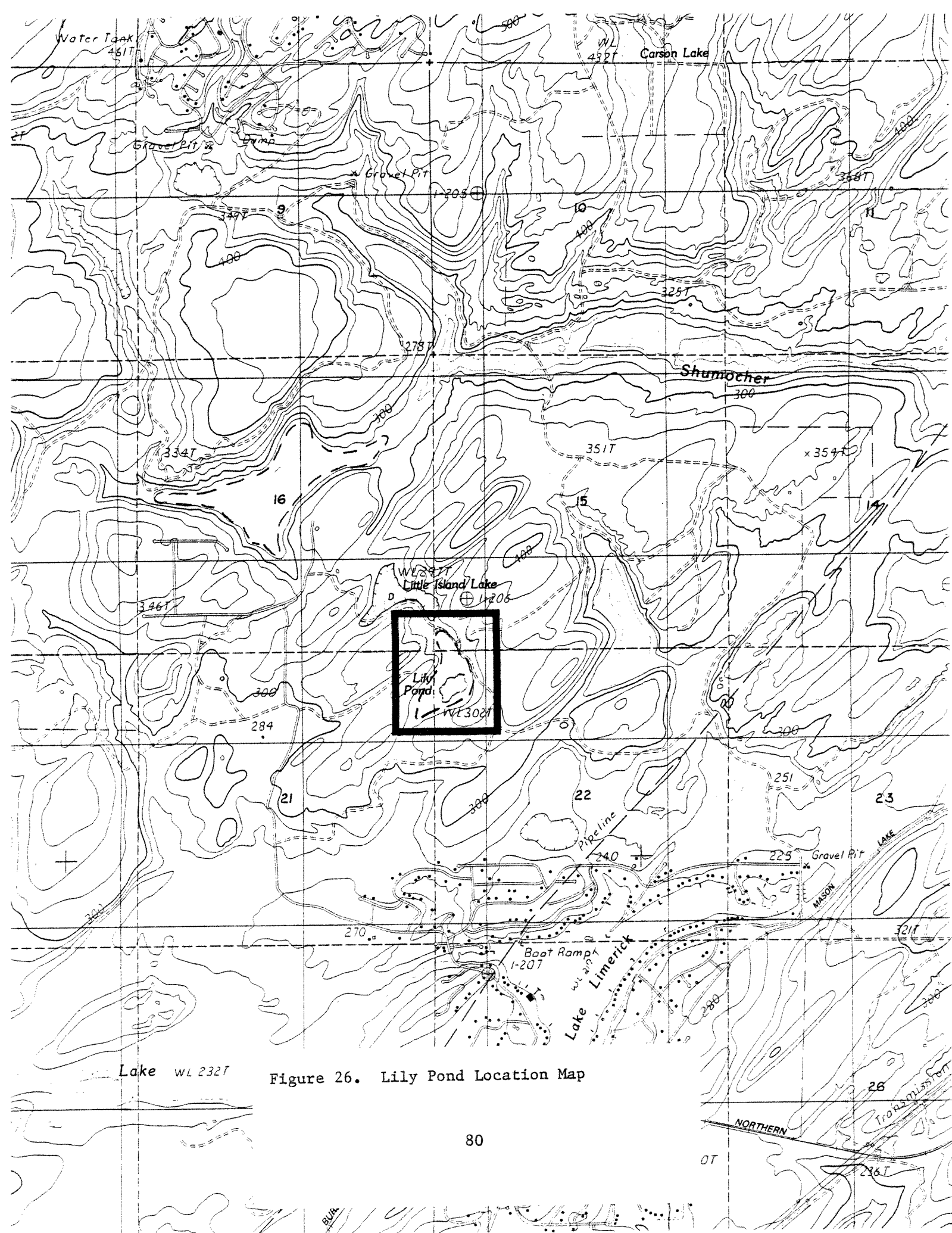
The lake is shallow and has a large annual water level fluctuation (about 10 feet). There is no channeled inflow, the lake is probably feed by surface run-off. The outflow is seasonal.

The lake and wetlands are underlain by glacial till. A layer of organic soil, of varying depth, overlays the lake bottom and most of the vegetated wetland. The upper zone of the lake basin has very little soil development.

Biological: Lake Armstrong has no aquatic vegetation. The waterward zone of wetland vegetation is nearly pure Carex vesicaria. It is a permanently flooded area with water about 1 foot deep in August. Landward of this zone is a dense stand of Spiraea douglasii which is seasonally flooded. The uppermost zone of wetland vegetation is occupied by a Pyrus fusca thicket. This area is flooded for a short time each year.

CONDITION: Lake Armstrong is part of a Girl Scouts camp and receives recreational use by them. A small area on the eastern margin of the lake is used for swimming and gatherings, and is kept clear of vegetation. The remainder of the lake and wetland receive no apparent use.

The uplands were clear cut in the past but now are selectively logged. An old eroding logging road crosses the outflow channel just downstream from the lake, and may have affected the outflow in the past.



Lake WL 232T

Figure 26. Lily Pond Location Map

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LILY POND

LOCATION: Mason County; Sections 15, 21, and 22, Township 21 North, Range 3 West, Willamette Meridian.

SIGNIFICANCE: Lily Pond is a second tier site. It is a shallow wetland which contains 4 freshwater wetland communities.

FEATURES: Freshwater Wetland:

1. Juncus balticus community
2. Nuphar polysepalum community
3. Dulichium arundinaceum community
4. Spiraea douglasii community

DESCRIPTION:

Physical: Lily Pond is a 14 acre wetland located at about 300 feet elevation on a rolling moraine. The wetland has no apparent channeled inflow or outflow. It is permanently flooded to supersaturated, and vegetated throughout. Soils appear to be very soft, black, anoxic, organic muck.

Biological: The wetland vegetation seems to progress inland from a Nuphar polysepalum community in relatively deep channels, to a Juncus balticus community, and then to a Dulichium arundinaceum community. All 3 of these communities occur in permanently flooded areas. The Spiraea douglasii community occurs adjacent to the upland and may be only seasonally flooded.

CONDITION: The wetland appears to be in good condition. However, it has been left as an island with nearly complete conversion of the adjacent lands to Christmas tree farms. Dirt roads are located along the east half of the wetland.

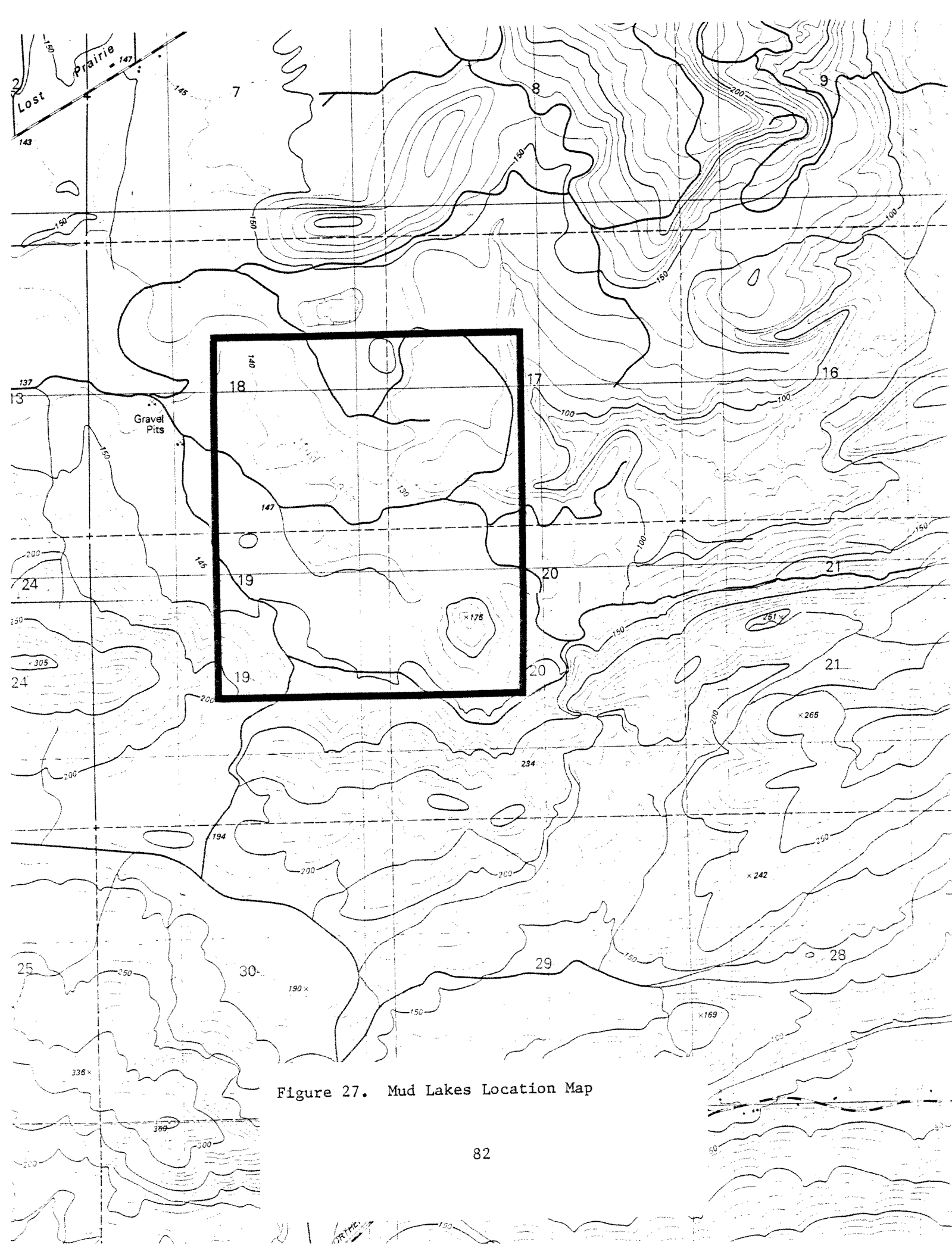


Figure 27. Mud Lakes Location Map

MUD LAKES

LOCATION: Mason County; Sections 17, 18, 19, and 20, Township 19 North, Range 4 West, Willamette Meridian.

SIGNIFICANCE: Mud Lakes is a second tier site consisting of 10 small kettle wetlands. The wetlands contain 5 freshwater wetland communities.

FEATURES: Freshwater Wetland:

1. Nuphar polysepalum community
2. Carex vesicaria community
3. Spiraea douglasii community
4. Fraxinus latifolia community
5. Cornus stolonifera-Salix spp.-Spiraea douglasii community

DESCRIPTION:

Physical: Mud Lakes is located at 160 feet elevation in a glacial outwash plain. 10 "lakes", small kettle wetlands scattered through the gravelly outwash, totalling 29 acres make-up Mud Lakes. Sandy ridges are associated with some of the kettles.

All of the kettle wetlands have large annual water level fluctuation. Some have permanent ponds and are surrounded by seasonally flooded wetlands. Some are seasonal wetlands. Some of the kettles have outflow channels draining into Gosnell Creek. Others have no apparent outflow.

The wetlands all have steep slopes. There is very little soil development on the slopes, but a layer of organic muck has accumulated in the bottoms of the kettles.

Biological: The wetland vegetation is similar in the 10 kettles. There are sharp vegetation zones which appear to be related to water levels and period of inundation.

The upper vegetation zones are dry during most of the summer and have very little soil development. In general, the uppermost zone is dominated by a Fraxinus latifolia community. Below that is a dense shrub zone dominated by Salix spp., Cornus stolonifera, and Spiraea douglasii in the overstory, and Maianthemum dilatatum in the understory. Below that community typically is found a short form Spiraea douglasii community. In 2 kettles, this community is preceded or interspersed with an ill-defined vegetation which is short (about 6 inches tall), species rich, and composed mostly of species not found elsewhere in the wetlands.

The lower vegetation zones are inundated year-round or at least during part of the summer. The uppermost of these communities is seasonally flooded and quite narrow. It is dominated by Eleocharis palustris and Siam suave. This community intergrades with the next community down, which is dominated by Carex vesicaria and typically has some Nuphar polysepalum. This community is permanently flooded. The lowest community is permanently flooded and is dominated by Nuphar polysepalum.

CONDITION: The Mud Lakes kettles generally are in good condition. The largest kettle has the remnants of a railroad bridge across one end. One of the other wetlands has a ridge through it which was probably used as a logging or skid road at one time. Cut logs are in most of the kettles. All of the uplands have been clearcut once and most are being prepared for a second logging. The Fraxinus latifolia zone was logged at one time. Any other effects of past logging have become obscured with time.

NORTH ELBOW LAKE

LOCATION: Thurston County; Section 29, Township 16 North, Range 3 East, Willamette Meridian.

SIGNIFICANCE: North Elbow Lake is a second tier site. It contains 2 freshwater wetland communities.

FEATURES: Freshwater Wetland:

1. Typha latifolia community
2. Potamogeton natans community

DESCRIPTION:

Physical: North Elbow Lake is an 11 acre wetland located at the foot of the Cascade Mountains at an elevation of 500 feet. It occurs in glacial drift between the Nisqually and Deschutes Rivers. The wetland has no apparent outlet.

The lake is completely vegetated. Most of the soils are organic muck.

Biological: Most of the wetland is covered with a stand of Typha latifolia. Examples of the Carex cusickii community occur at the bases of some of the Typha and over logs.

On the east side of the wetland is an area covered with aquatic vegetation dominated by Potamogeton natans, Utricularia vulgaris, and Lemna minor.

CONDITION: The wetland has been disturbed but appears to be recovering well. No exotic plant species were observed in the wetland.

A road was built across a portion of the wetland, probably on fill. The uplands have all been logged and no buffer was retained. One patch of Typha latifolia is dead and native wetland species, not found elsewhere in the wetland, are becoming established in its place.

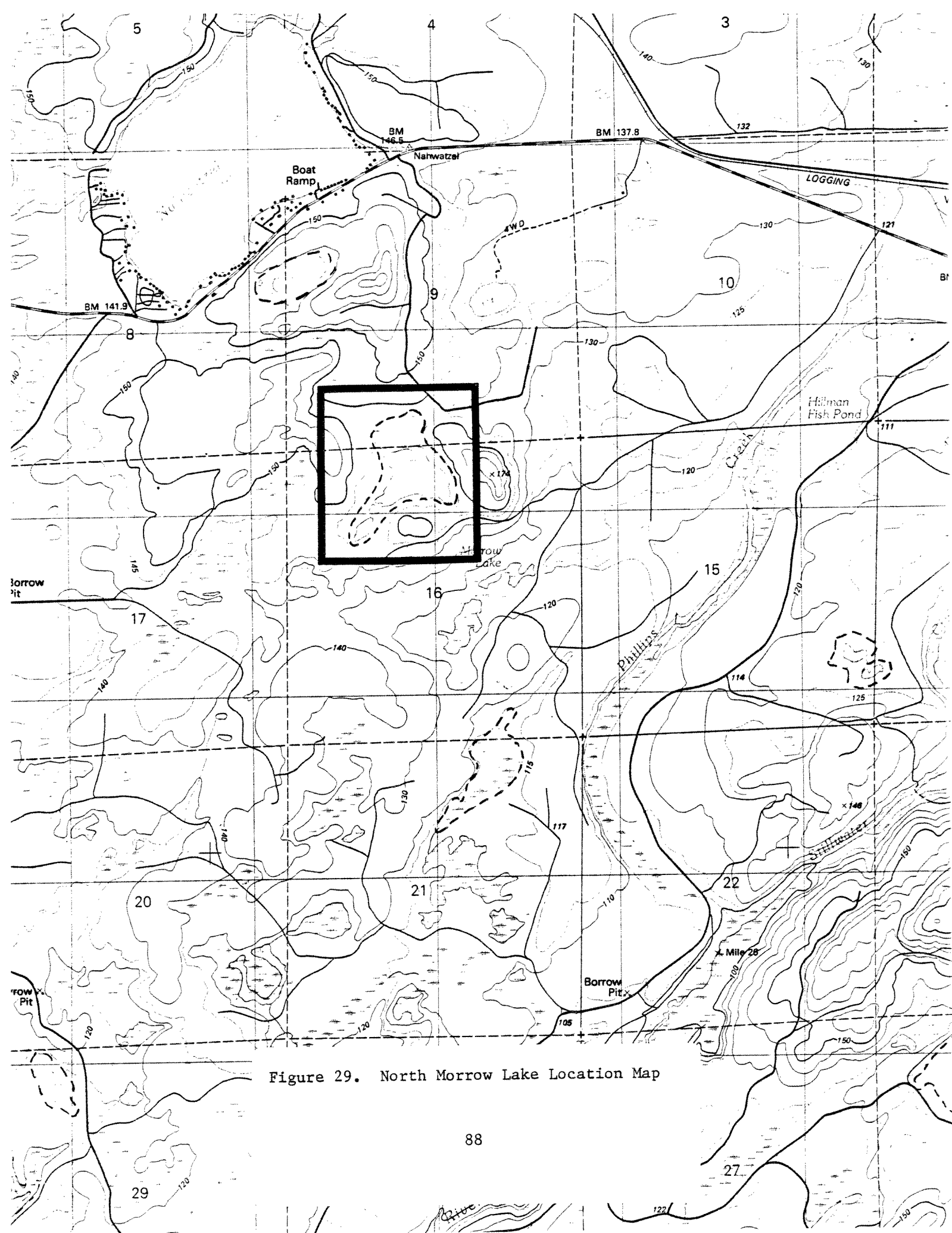


Figure 29. North Morrow Lake Location Map

NORTH MORROW LAKE

LOCATION: Mason County; Sections 9 and 16, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: North Morrow Lake is a second tier site. It contains 1 sphagnum bog community and 4 freshwater wetland communities.

FEATURES: Sphagnum Bog:

1. Kalmia occidentalis/Sphagnum spp. community

Freshwater Wetland:

1. Juncus balticus community
2. Carex sitchensis community
3. Alnus rubra/Rubus spectabilis community
4. Tsuga heterophylla/Lysichitum americanum community

DESCRIPTION:

Physical: North Morrow Lake is a 33 acre wetland located at 145 feet elevation on a rolling moraine. A diverse vegetated wetland extends north from a shallow impoundment. Water flows from the north into and through the wetland by several braided channels. The wetland drains to the southwest.

The wetland soils are complex. Near the impoundment there are areas of organic muck that are permanently flooded to seasonally flooded and then supersaturated. To the north the wetland soils become fibrous peat with some heath peat, and are seasonally flooded. In this area is a patch of soft, deep, hummocky sphagnum and heath peat that is wet but not flooded. Farther to the north are wet organic soils composed of evergreen needles, woody material, and fibrous peat. This area has braided stream channels with sandy bottoms.

Biological: The sphagnum bog community is 5 acres and is a mixture of the Kalmia occidentalis/Sphagnum spp. and Ledum groenlandicum/Sphagnum spp. communities. It occurs on very soft sphagnum peat covered by a deep layer of living sphagnum.

The Juncus balticus community occurs along the margin of the impoundment in a permanently flooded area. The Carex sitchensis community also occurs along the impoundment margin but in areas that have shallower water than the J. balticus community, and areas that are supersaturated. Together, these communities cover 7 acres.

An 8 acre Alnus rubra/Rubus spectabilis community and a 5 acre Tsuga heterophylla/Lysichitum americanum community occur at the north end of the wetland in the area with braided stream channels. Both communities have dense shrub understories.

CONDITION: The wetland has been disturbed in the past but appears to be recovering. The forested wetland communities have been selectively logged, apparently for Thuja plicata. The water level in the wetland has been altered at least once. It was probably raised, inundating and killing a Spiraea douglasii community that once occurred along the margin of the impoundment. The Juncus balticus and Carex sitchensis communities occur in areas densely covered with the decaying bases of Spiraea douglasii. The water level fluctuation may be caused by beaver.

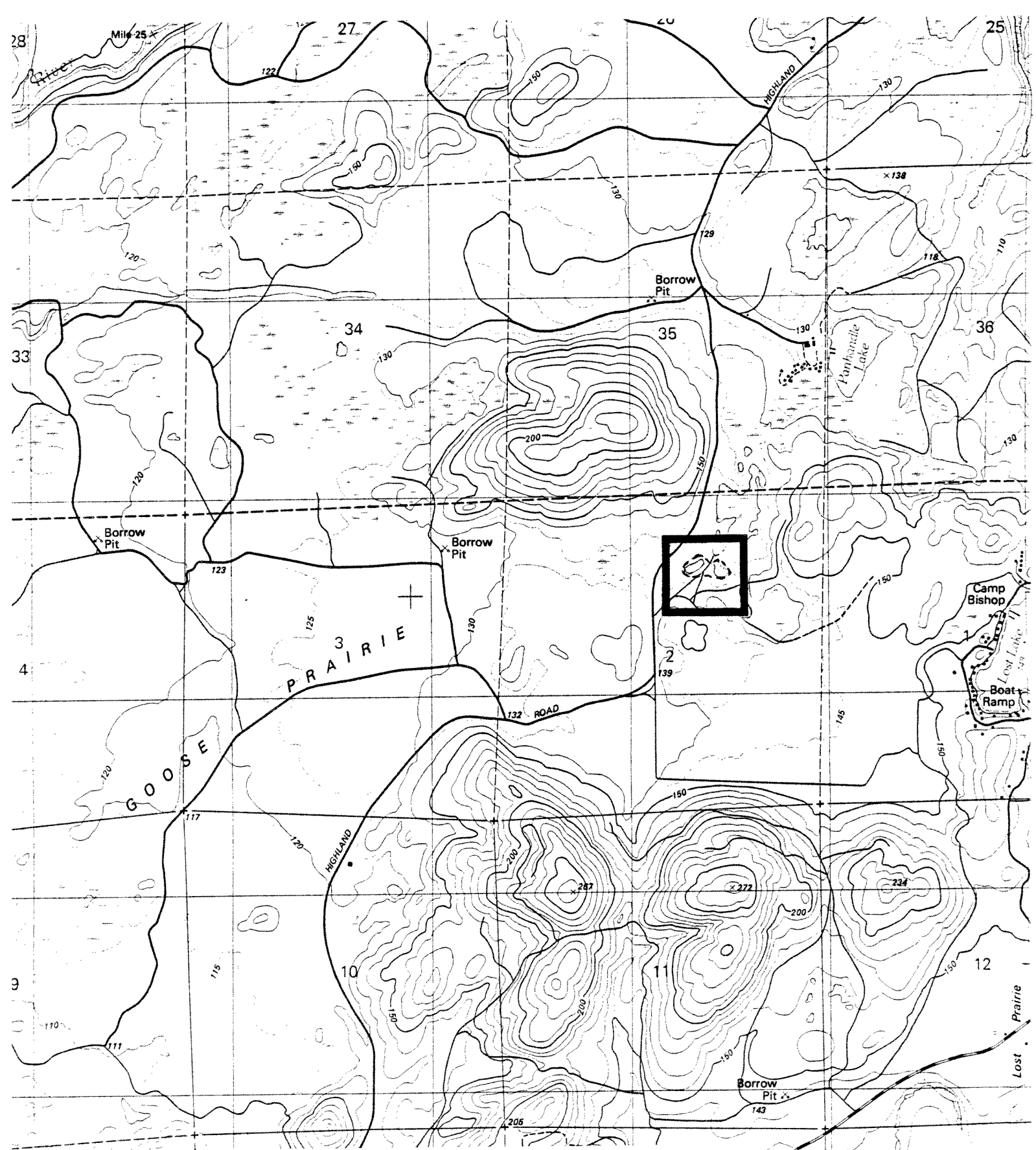


Figure 30. Panhandle Kettles Location Map

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PANHANDLE KETTLES

LOCATION: Mason County; Section 2, Township 19 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Panhandle Kettles is a second tier site. It consists of 2 kettles which contain 3 freshwater wetland communities.

FEATURES: Freshwater Wetland:

1. Carex vesicaria community
2. Carex scopulorum community
3. Spiraea douglasii/Apocynum medium community

DESCRIPTION:

Physical: Panhandle Kettles are located at 130 feet elevation on glacial outwash. The 2 kettles are small, totalling 2 acres. They have steep sides and large annual water level fluctuations. The western kettle receives seasonal flow from a wetland to the northeast but has no apparent outflow. The eastern kettle has no apparent inflow or outflow channel.

The bottom of each kettle is a small permanently flooded to supersaturated area. These areas have a layer of black, anoxic, organic muck overlying the coarse textured substrates. The sides of the kettles are seasonally flooded but become very dry during the summer. The sides have coarse textured substrates: sand, gravel, and cobble.

Biological: The bottom of each kettle is covered by an example of the Carex vesicaria community. This is a monospecific community, except for a little Carex obnupta.

On the sides of the kettles occur examples of the unusual Spiraea douglasii/Apocynum medium community. These are the only known occurrences of this community. Similarly, the western kettle contains an occurrence of another unusual community, the Carex scopulorum community. It occurs on a seasonally dry ridge that bisects the kettle.

CONDITION: Both kettle wetlands have been disturbed by humans but are included in this report because they are unusual. The kettles also have surprisingly few exotic plant species.

The uplands were logged in the past and woody debris and logs from the logging have collected in the wetlands. The upper margin of the eastern kettle has been disturbed recently; soil and vegetation have been bull-dozed and driven over. The inflow channel to the western kettle is crossed by an old logging road and there is evidence that the road impeded flow at one time. The ridge that bisects the western kettle appears

to have been driven over, probably during the early logging operations.

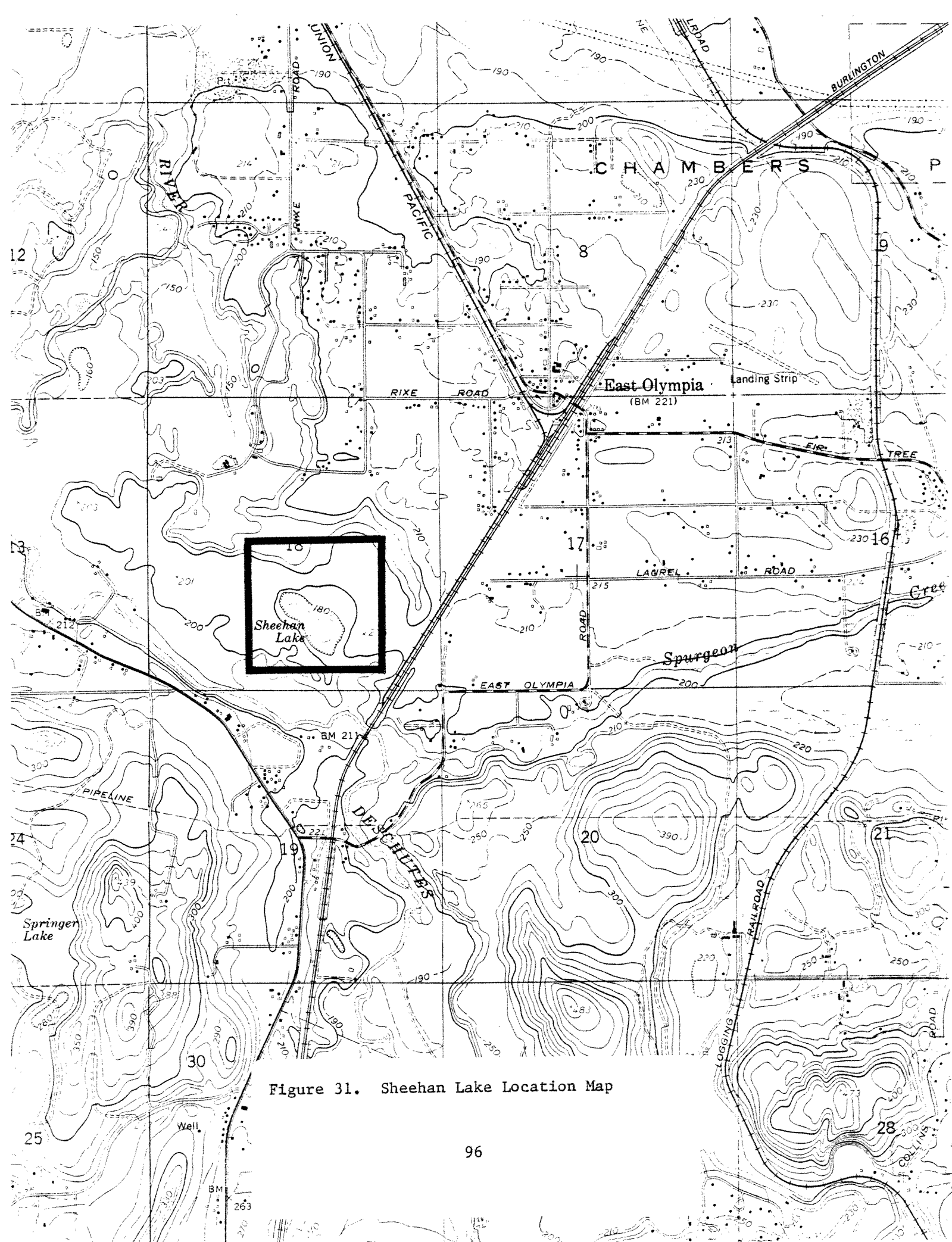


Figure 31. Sheehan Lake Location Map

SHEEHAN LAKE

LOCATION: Thurston County; Section 18, Township 17 North, Range 1 West, Willamette Meridian.

SIGNIFICANCE: Sheehan Lake is a second tier site.

FEATURES: Sphagnum Bog:

1. Rhynchospora alba/Sphagnum spp. community
2. Ledum groenlandicum/Sphagnum spp. community
3. Carex sitchensis/Sphagnum spp. community

DESCRIPTION:

Physical: Sheehan Lake is a 9 acre pond and wetland located at 200 feet elevation in a sandy outwash plain. The wetland is dumb-bell shaped and is oriented northwest and southeast. There is no apparent outlet.

Sheehan Lake is composed of a 3 acre pond and 6 acres of sphagnum bog. The pond is located in the southeast lobe of the wetland. The bog soils are a mosaic of sphagnum, fibrous, and heath peat. The areas with predominantly fibrous peat soils are permanently but shallowly flooded. The other areas have saturated soils. At the south end of the pond is a small area of permanently flooded forested wetland with organic muck, fibrous peat, and woody peat soils.

Biological: Quaking sphagnum lobes around the pond margin are dominated by the Rhynchospora alba/Sphagnum spp. community. The community has high cover of Carex limosa, Menyanthes trifoliata, and Vaccinium oxycoccos. Away from the pond margin, the bog vegetation shifts to the tall form of the Ledum groenlandicum/Sphagnum spp. community. This community forms the outer margin of the northwestern lobe of the wetland also.

The central portion of the northwestern lobe of the wetland is a Carex sitchensis/Sphagnum spp. community. It is permanently, but shallowly flooded, and has a few pockets of water with Nuphar polysepalum.

CONDITION: Sheehan Lake receives some recreational use. There are a few trails and a camp site around the upland margin of the wetland. A few trails extend out through the bog to the pond margin. A wooden raft is tied up at one end of the pond and the adjacent area is highly trampled.

A portion of the Ledum groenlandicum/Sphagnum spp. community in the northwestern lobe of the wetland has been trampled, possibly by livestock. There are signs of an old homestead on the uplands to the west of the wetland.

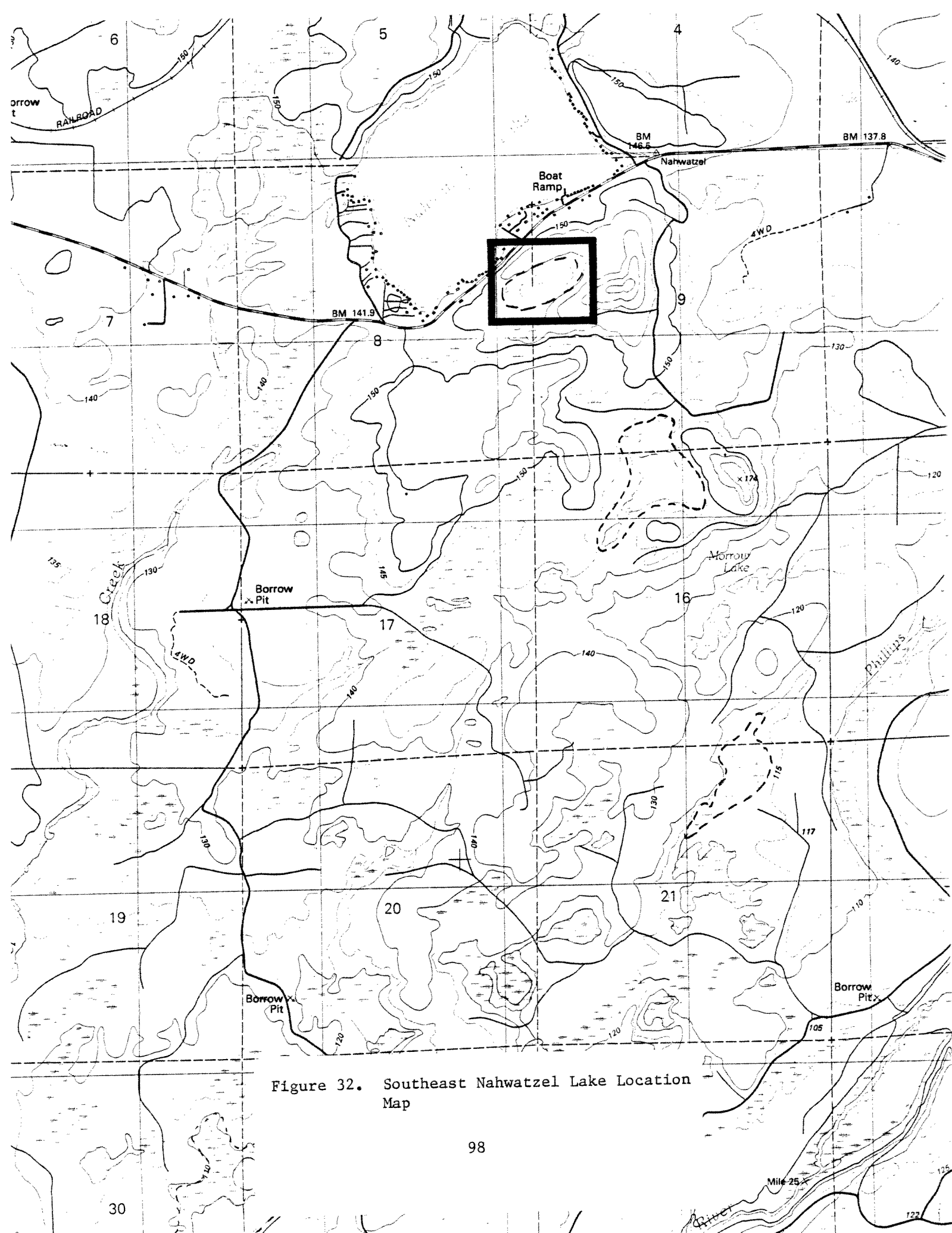


Figure 32. Southeast Nahwatzel Lake Location Map

SOUTHEAST NAHWATZEL LAKE

LOCATION: Mason County; Sections 8 and 9, Township 20 North, Range 5 West, Willamette Meridian.

SIGNIFICANCE: Southeast Nahwatzel Lake is a second tier site. It consists of a small lake, 3 sphagnum bog communities, and 1 freshwater wetland community.

FEATURES: Sphagnum Bog:

1. Rhynchospora alba/Sphagnum spp. community
2. Kalmia occidentalis/Sphagnum spp. community
3. Ledum groenlandicum/Sphagnum spp. community

Freshwater Wetland:

1. Spiraea douglasii community

DESCRIPTION:

Physical: Southeast Nahwatzel Lake is a 15 acre, oval shaped, wetland system. It is located at 155 feet elevation on a northeast-southwest oriented rolling moraine. The wetland has no apparent inflow or outflow channel.

The lake is 8 acres and is of undetermined quality. It is surrounded by a 5 acre mat of sphagnum and heath peat. The waterward zone of sphagnum peat quakes and is saturated. Landward the peat becomes firmer and drier. Landward of the sphagnum mat is a zone of freshwater wetland. The soils vary from dense fibrous, heath, and woody peat, to glacial till with a thin layer of organic matter. The freshwater wetland is seasonally flooded, becoming saturated to supersaturated in the summer.

Biological: The quaking lakeward margin of the sphagnum mat is dominated by an example of the Rhynchospora alba/Sphagnum spp. community. Landward, on the firmer sphagnum mat, the vegetation shifts to a mixture of the Kalmia occidentalis/Sphagnum spp. and Ledum groenlandicum/Sphagnum spp. communities. This is a dense shrub dominated community which has unusually high percent cover of Thuja plicata.

The freshwater wetland is an unusual example of a Spiraea douglasii community. It has 30% or more cover of sedge species, Carex obnupta, C. sitchensis, and C. rostrata. Portions of it are periodically flooded by beaver activity. Other portions are drier and begin to shift towards a Pyrus fusca community.

CONDITION: The wetland is in relatively good condition. It has had some human disturbance. There is one trail which leads through the bog onto the quaking mat at the lake's edge. The

trail doesn't appear to receive a lot of use but some of the quaking mat has been trampled.

There are two oddly straight and even channels which extend through the bog at the west end of the lake. The channels were probably excavated by humans a long time ago. The water level in the freshwater wetland has been altered.

The adjacent uplands were logged at one time and no buffer was retained. Cut logs are located throughout the freshwater wetland. Old logging roads reach the wetland edge at two points. Most effects of logging have been obscured by time.

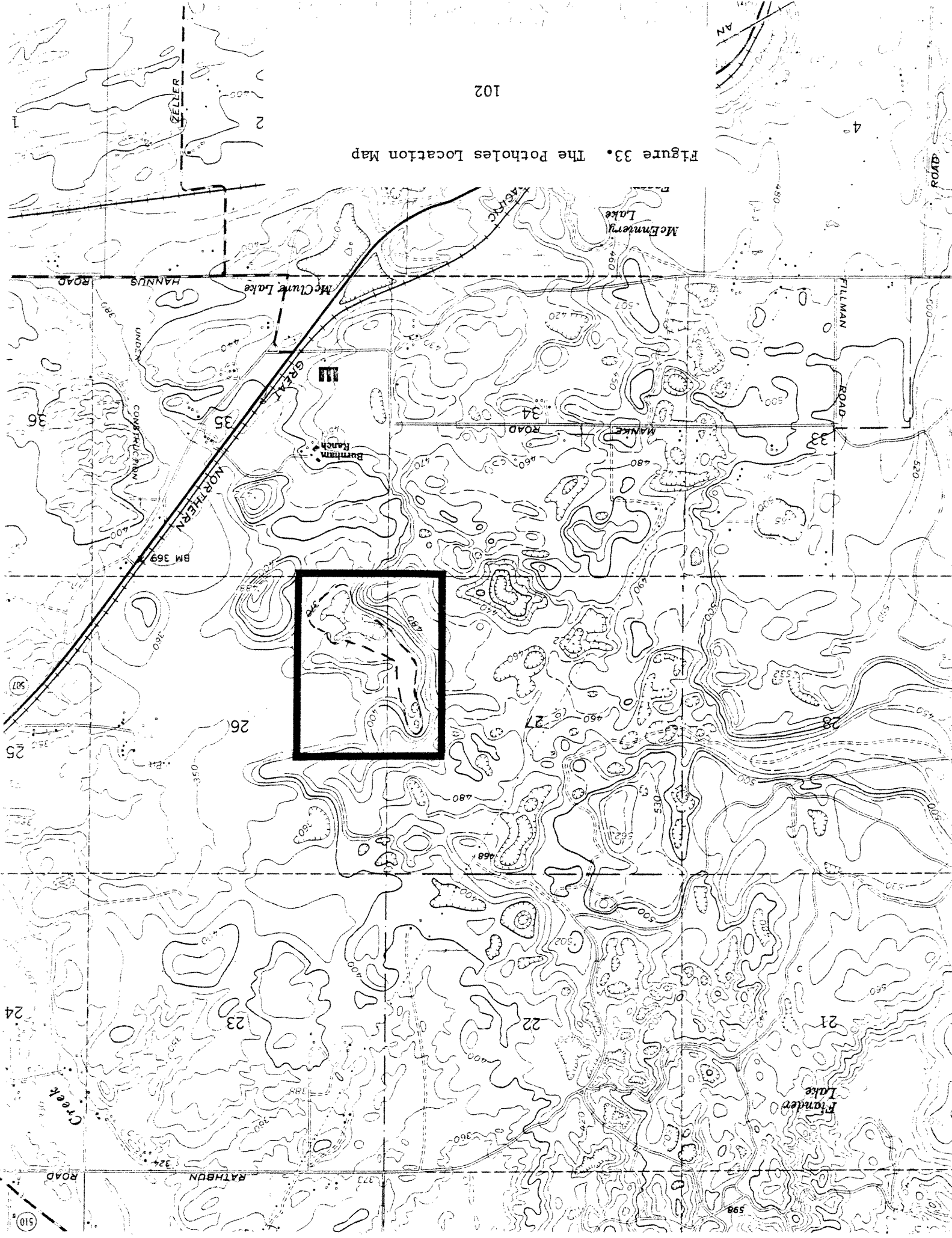


Figure 33. The Potholes Location Map

THE POTHoles

LOCATION: Thurston County; Sections 26 and 27, Township 17 North, Range 1 East, Willamette Meridian.

SIGNIFICANCE: The Potholes is a second tier site. It has 1 sphagnum bog and 1 freshwater wetland community.

FEATURES: Sphagnum Bog:

1. Ledum groenlandicum/Sphagnum spp. community

Freshwater Wetland:

1. Spiraea douglasii community

DESCRIPTION:

Physical: The Potholes is a 9 acre series of wetlands located at 360-370 feet elevation on a moraine with knoll-like topography. The wetland has no channeled outlet or inflow. Most of it is seasonally flooded.

The freshwater wetland soils are a mixture of fibrous and heath peat. The sphagnum bog area has at least a surface layer of mixed sphagnum, fibrous, and heath peat. There is a small area which is a seasonal pond that has black, anoxic, organic, muck soils.

Biological: The sphagnum bog is about 2 acres and is covered with a Ledum groenlandicum/Sphagnum spp. community. There is only about 50% cover of Sphagnum spp. Small chlorotic Pseudotsuga menziesii are scattered through the bog suggesting that the organic soils in that area are shallow.

The 7 acre freshwater wetland is dominated by Spiraea douglasii 6-8 feet tall. Around the wetland margins, Salix spp. are codominant. In one portion of the wetland margin, Fraxinus latifolia is codominant. There is one small area of seasonal ponds that is dominated by Potamogeton natans, Nuphar polysepalum, and Glyceria elata.

CONDITION: The Potholes appear to be in excellent condition. Any effects of past logging have been obscured. It is a second tier site because of its small size.

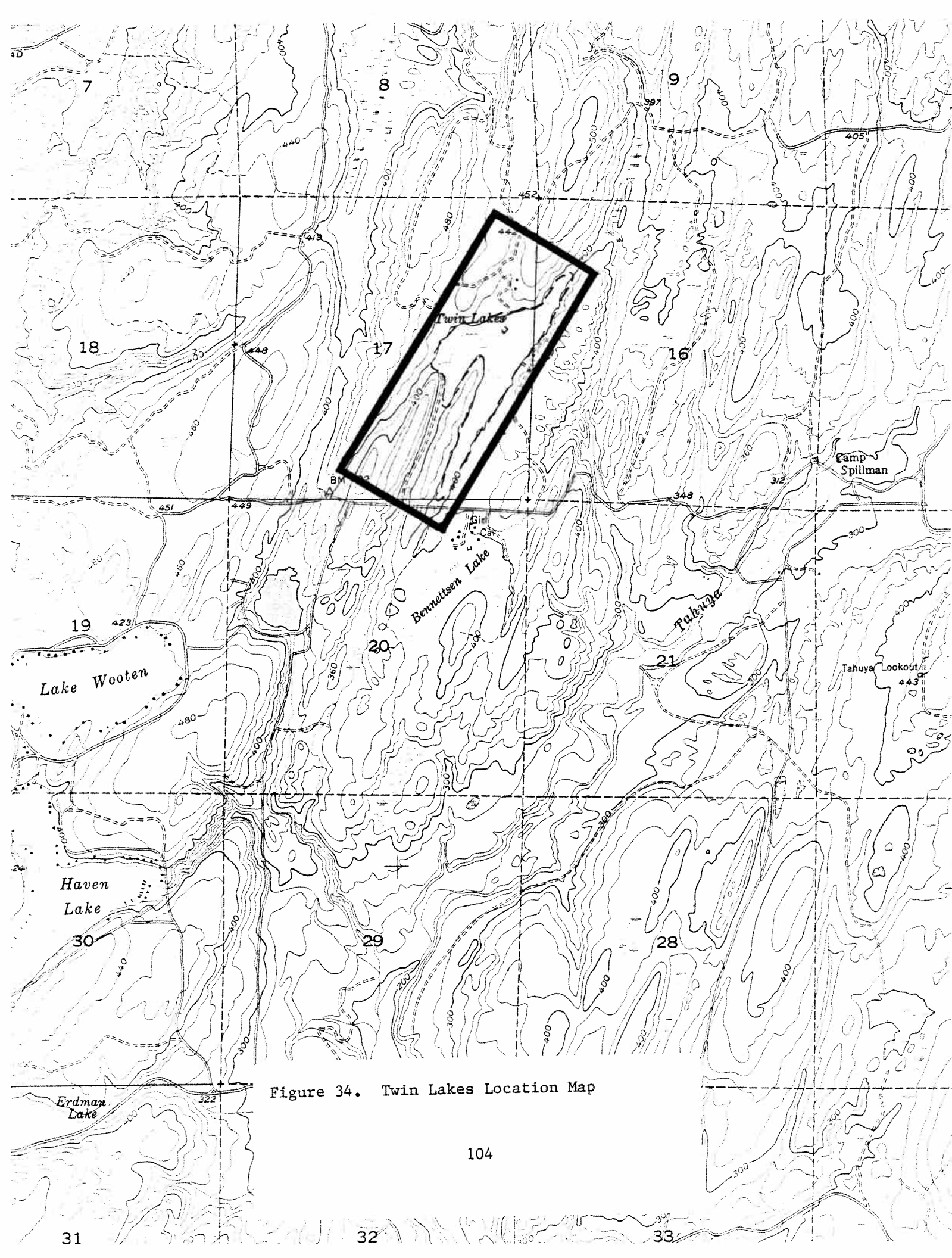


Figure 34. Twin Lakes Location Map

TWIN LAKES

LOCATION: Mason County, Sections 16 and 17, Township 23 North, Range 2 West, Willamette Meridian.

SIGNIFICANCE: Twin Lakes is a second tier site which contains 2 sphagnum bog communities and 1 sensitive plant species.

FEATURES: Sphagnum Bog:

1. Rhynchospora alba/Sphagnum spp. community
2. Kalmia occidentalis/Sphagnum spp. community

Special Species:

- 1 sensitive plant species

DESCRIPTION:

Physical: Twin Lakes is located at 395 feet elevation on a nearly north-south oriented moraine. There are 2 elongated basins which are partially separated by a low ridge. Each basin has a central area of open water with vegetated wetlands mostly to the north and south. Each basin drains to the south. Their drainages converge to the south and flow into the Tahuya River.

Five acres of the wetland's 46 acres are of interest. These 5 acres are sphagnum bog with sphagnum, fibrous, and heath peat. The soils are saturated.

Biological: The Rhynchospora alba/Sphagnum spp. community occurs along the bog margin in both basins. The sphagnum mat is quaking and areas have been excavated, probably by beavers.

The rest of the bog area is covered with a low growing, open shrub community dominated by Kalmia occidentalis and Vaccinium oxycoccus. There is about 10% cover of small Pinus contorta.

CONDITION: The sphagnum bog areas around Twin Lakes are in relatively good condition. The hydrology of the system appears to have been altered at some time in the recent past, severely disrupting the freshwater wetland vegetation. The sphagnum substrate probably buffered the bog from effects of the altered water level.

The most serious threat to the bog is from trampling and fires. Access to the bog mats is not difficult and with the location of state and private recreation facilities around the lakes, the bog mats receive a lot of foot traffic. Trails through parts of the bog are well established. Wood and boards have been carried onto the bog to build platforms along the bog/lake margin, possibly for hunting and fishing. Litter has been left

on the bog surface and in the water. Campfires have been made next to the platforms. These impacts are beginning to seriously degrade portions of the bog.

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APPENDIX A

**PRELIMINARY CLASSIFICATION
OF
PUGET TROUGH FRESHWATER IMPOUNDED WETLANDS**

This is an initial classification of native vegetation in impounded freshwater wetlands located in the Puget Trough.

The classification is intended to assist in the characterization and comparison of native wetlands in the Puget Trough region. It was developed following a review of the literature and four years of reconnaissance level field surveys of relatively undisturbed wetlands. It should be treated as a preliminary classification, ready for quantitative field testing.

During field surveys, each site was characterized by describing its apparent physical characteristics and communities of plant species. The communities were identified by: 1) dominant species, 2) presence or absence of key indicator species, and 3) observable differences in environmental conditions, such as soil characteristics or hydrology. During the reconnaissance, a range of percent cover was recorded for each of the dominant species and often for all observed species. The amount and detail of information varied depending upon the accessibility of the site.

Wetland plant communities are difficult to define. Discrete communities are not typical. Instead, continua and mosaics of species appear to be the norm. Some of the recognized communities recur throughout the inventory area. Others were variable, but tended towards recurring communities. Yet others did not recur or were not consistent in their associated species or environmental characteristics.

The classification below has been divided into two parts. The first includes recurring communities, that is those for which at least three examples were found. The second includes communities observed to occur two or fewer times, or which occurred more frequently but were highly variable in their associated species composition.

The classification is similar to that used for the May, 1986 Northwest Wetlands Technical Conference convened by the Washington Department of Ecology in Port Townsend, Washington. The classification differs from that used at the conference in that it does not include information on soils. It also provides one finer level of resolution than did the conference classification; the plant community level. The classification is compatible with Cowardin et al., 1979.

CLASSIFICATION OF RECURRING COMMUNITIES:

I. Low Elevation Sphagnum Bog

A. Non-macrophyte

1. bog pond

B. Herb Dominated

1. Carex cusickii/Sphagnum spp. community
2. Rhynchospora alba/Sphagnum spp. community

C. Shrub Dominated

1. Kalmia occidentalis/Sphagnum spp. community
2. Ledum groenlandicum/Sphagnum spp. community
3. Spiraea douglasii/Sphagnum spp. community

D. Tree Dominated

1. Pinus contorta/Ledum groenlandicum/Sphagnum spp. community
2. Tsuga heterophylla/Ledum groenlandicum/Sphagnum spp. community
3. Tsuga heterophylla/Sphagnum spp. community

II. Low Elevation Freshwater Wetland

A. Permanently Flooded

1. Non-macrophyte
 - a. pond/lake
2. Macrophyte
 - a. Hippuris vulgaris community
 - b. Juncus balticus community
 - c. Nuphar polysepalum community
 - d. Scirpus acutus community
 - e. Scirpus subterminalis community
 - f. Typha latifolia community

B. Saturated Soils or Seasonally Flooded

1. Herb Dominated
 - a. Calamagrostis canadensis community
 - b. Carex cusickii community
 - c. Carex obnupta community
 - d. Carex rostrata community
 - e. Carex sitchensis community
 - f. Carex vesicaria community
 - g. Dulichium arundinaceum community

2. Shrub Dominated

- a. Alnus sinuata community
- b. Spiraea douglasii community

3. Tree Dominated

- a. Alnus rubra/Lysichitum americanum community
- b. Alnus rubra/Rubus spectabilis community
- c. Fraxinus latifolia community
- d. Pyrus fusca community
- e. Tsuga heterophylla/Lysichitum americanum community

CLASSIFICATION OF NON-RECURRING COMMUNITIES:

- I. Low Elevation Sphagnum Bog
 - A. Non-macrophyte
 - none
 - B. Herb Dominated
 - 1. Carex sitchensis/Sphagnum spp. community
 - C. Shrub Dominated
 - none
 - D. Tree Dominated
 - 1. Pinus monticola/Ledum groenlandicum/Sphagnum spp. community
- II. Low Elevation Freshwater Wetland
 - A. Permanently Flooded
 - 1. Non-macrophyte
 - none
 - 2. Macrophyte
 - a. Potamogeton natans community
 - B. Saturated Soils or Seasonally Flooded
 - 1. Herb Dominated
 - a. Carex spp. community
 - b. Carex lasiocarpa community
 - c. Carex livida community
 - d. Carex scopulorum community
 - e. Glyceria elata community
 - 2. Shrub Dominated
 - a. Cornus stolonifera-Salix spp.-Spiraea douglasii community
 - b. Salix spp. community
 - c. Spiraea douglasii/Apocynum medium community
 - 3. Tree Dominated
 - a. Thuja plicata community

APPENDIX B

PUGET TROUGH FRESHWATER IMPOUNDED WETLAND COMMUNITY DESCRIPTIONS

Described below are those wetland communities which are known to occur within the study area. The descriptions provide information on the physical and floristic characteristics of each community. Included are species lists which distinguish between the dominant or characteristic species ("Typical Species"), and those which were minor or uncharacteristic ("Other Species"). Average percent cover is given for the "typical species".

The community descriptions are presented in two major groups, the first includes those communities which were observed to recur in the landscape, while the second includes those which were not observed to recur. Within each of these major categories are two subheadings: sphagnum bog communities, and freshwater (non-sphagnum) communities. The community descriptions are listed below these subheadings in the order in which they appear in the classifications above.

RECURRING COMMUNITIES

LOW ELEVATION SPHAGNUM BOG COMMUNITIES

A sphagnum bog is characterized by the presence of sphagnum moss species (Sphagnum spp.) and a preponderance of sphagnum peat. Bogs have low pH and low nutrient availability. They typically develop in cold drainage basins. This set of conditions give rise to an unusual flora, many species of which are unique to sphagnum bogs.

Bog Pond: Typically these are small bodies of water bounded on at least one side by sphagnum peat. The pH of the water is 5.5 or less. The water is usually brown to red brown in color. Often these ponds are surrounded by mats of sphagnum which slowly extend out over the water's surface and finally fill-in the basin. These ponds frequently overlay sedge, woody, and sphagnum peat.

Carex cusickii/Sphagnum spp. community: This community occurs on sphagnum peat or a combination of sphagnum and sedge peat which is supersaturated. It appears to be one of the bog communities which colonizes open water. It is most frequently found along the edge of the sphagnum mat adjacent to open water, but may also form large floating mats.

Typical species:

Carex cusickii 25-45%
Potentilla palustris 2-20%
Agrostis scabra
Hypericum anagalloides
Menyanthes trifoliata

Other species:

Carex interior complex	Ledum groenlandicum
Carex leptalea	Mentha arvensis
Carex rostrata	Rhynchospora alba
Carex sitchensis	Scirpus acutus
Drosera rotundifolia	Spiraea douglasii
Eriophorum chamissonis	Typha latifolia
Galium trifidum	Vaccinium oxycoccos
Kalmia occidentalis	Viola cf palustris

Rhynchospora alba/Sphagnum spp. community: This community occurs on supersaturated sphagnum peat and moss. It is typically found in a band along the quaking margin of a sphagnum mat adjacent to open water or just inland of the Carex cusickii community. Rhynchospora alba is the most characteristic plant species, though a large number of species may occur in the community. Shrub species, when found in this community, have a short growth form.

This community also includes small areas dominated by Eriophorum chamissonis. These areas typically have very thin layers of floating peat and few other species associated with them.

Typical Species:

Rhynchospora alba 15-60%
Vaccinium oxycoccos 1-35%
Drosera rotundifolia 5-15%
Kalmia occidentalis 1-10%
Cladina rangiferina 1-5%

Other species:

Carex leptalea	Lycopus uniflorus
Carex rostrata	Lysichitum americanum
Eriophorum chamissonis	Menyanthes trifoliata
Ledum groenlandicum	Tofieldia glutinosa

Kalmia occidentalis/Sphagnum spp. community: The Kalmia occidentalis/Sphagnum spp. community may be predominant over large areas or, more frequently, it forms a mosaic with the short form of the Ledum groenlandicum/Sphagnum spp. community. It forms a low growing, open shrub bog over firm, relatively dry, sphagnum peat, but also extends onto the supersaturated portion of the quaking bog mat.

Typical species:

Kalmia occidentalis 25-45%
Ledum groenlandicum 1-25%
Vaccinium oxycoccos 2-25%
Drosera rotundifolia 1-5%

Other species:

<i>Carex canescens</i>	<i>Potentilla palustris</i>
<i>Carex cusickii</i>	<i>Pteridium aquilinum</i>
<i>Carex sitchensis</i>	<i>Rhamnus purshiana</i>
<i>Cladina rangiferina</i>	<i>Rhynchospora alba</i>
<i>Eriophorum chamissonis</i>	<i>Spiraea douglasii</i>
<i>Gaultheria shallon</i>	<i>Trientalis arctica</i>
<i>Lysichitum americanum</i>	<i>Tsuga heterophylla</i>
<i>Menyanthes trifoliata</i>	<i>Typha latifolia</i>
<i>Pinus contorta</i>	<i>Viola palustris</i>
<i>Pinus monticola</i>	

Ledum groenlandicum/Sphagnum spp. community: This community typically occurs on firm, at least seasonally dry sphagnum and woody peat. It has two growth forms. The first is low (2-4 feet tall), has about 60% cover of Ledum groenlandicum, and has a large number of associated species. The second is tall (6-10 feet tall), has about 100% cover of L. groenlandicum, and has a lower number, or at least abundance, of associated species.

Included within this community is a L. groenlandicum/Carex rostrata phase which occurs in wet pockets and in the transition zone between non-sphagnum and sphagnum wetlands.

Typical species:

Ledum groenlandicum 50-90%
Gaultheria shallon 1-50%
Carex rostrata 0-25%
Kalmia occidentalis 0-10%

Other species:

<i>Carex canescens</i>	<i>Pinus monticola</i>
<i>Carex interior complex</i>	<i>Pteridium aquilinum</i>
<i>Carex leptalea</i>	<i>Pyrus fusca</i>
<i>Cladina rangiferina</i>	<i>Spiraea douglasii</i>
<i>Drosera rotundifolia</i>	<i>Thuja plicata</i>
<i>Empetrum nigrum</i>	<i>Tsuga heterophylla</i>
<i>Eriophorum chamissonis</i>	<i>Vaccinium oxycoccos</i>
<i>Picea sitchensis</i>	<i>Vaccinium parvifolium</i>
<i>Pinus contorta</i>	

Spiraea douglasii/Sphagnum spp. community: This community occurs on terraces composed of a mixture of sphagnum, sedge, and woody

peat. Soils are typically shallow (< 3 feet deep) and overlay glacial till or outwash. Spiraea douglasii has a short growth form (2-4 feet tall). The terraces are typically elevated above a pond and may be seasonally flooded. A large number of plant species co-occur with the S. douglasii. Gentiana sceptrum is an indicator species.

Typical species:

Spiraea douglasii 50-90%
Carex sitchensis 5-10%
Carex obnupta 1-10%
Gentiana sceptrum 1-5%

Other species:

<u>Carex rostrata</u>	<u>Menyanthes trifoliata</u>
<u>Carex vesicaria</u>	<u>Nuphar polysepalum</u>
<u>Dulichium arundinaceum</u>	<u>Pyrus fusca</u>
<u>Kalmia occidentalis</u>	<u>Salix spp.</u>
<u>Ledum groenlandicum</u>	<u>Trientalis arctica</u>

Pinus contorta/Ledum groenlandicum/Sphagnum spp. community: This community grades from open shrublands with the low growth form of Ledum groenlandicum and scattered Pinus contorta, to very dense stands of P. contorta and the tall growth form of L. groenlandicum. It occurs on dry firm sphagnum substrates to quaking bog mats.

Typical species:

Pinus contorta 20-50%
Ledum groenlandicum 30-75%
Gaultheria shallon 2-20%

Other species:

<u>Cladina rangiferina</u>	<u>Pyrus fusca</u>
<u>Drosera rotundifolia</u>	<u>Spiraea douglasii</u>
<u>Empetrum nigrum</u>	<u>Thuja plicata</u>
<u>Eriophorum chamissonis</u>	<u>Trientalis arctica</u>
<u>Kalmia occidentalis</u>	<u>Tsuga heterophylla</u>
<u>Lysichitum americanum</u>	<u>Vaccinium oxycoccos</u>
<u>Pteridium aquilinum</u>	<u>Vaccinium parvifolium</u>

Tsuga heterophylla/Ledum groenlandicum/Sphagnum spp. community:

This is a common sphagnum bog community which occurs on relatively dry sphagnum peat. It resembles the Ledum groenlandicum/Sphagnum spp. community except for the percent cover of Tsuga heterophylla. The T. heterophylla is usually quite short near open water, increasing in height inland. Height is not necessarily correlated with age.

Typical species:

Tsuga heterophylla 15-20%

Ledum groenlandicum 30-60%
Gaultheria shallon 15%

Other species:

Carex canescens	Picea sitchensis
Cladina rangiferina	Pinus monticola
Cornus canadensis	Pteridium aquilinum
Kalmia occidentalis	Spiraea douglasii
Lysichitum americanum	Thuja plicata
Maianthemum dilatatum	Trientalis arctica
Menziesia ferruginea	Vaccinium oxycoccus

Tsuga heterophylla/Sphagnum spp. community: This community probably is a later successional stage for Tsuga heterophylla/Ledum groenlandicum/Sphagnum spp. bogs. It occurs on deep sphagnum peat with the water table about one foot below the surface. The canopy is nearly closed. There is almost no understory except where there are breaks in the canopy. Trees that are 12-14 inches in diameter at breast height (DBH) may be over 300 years old.

Typical species:

Tsuga heterophylla 80%
Ledum groenlandicum 2-5%
Gaultheria shallon 2-5%

Other species:

Kalmia occidentalis	Vaccinium oxycoccus
Maianthemum dilatatum	Vaccinium parvifolium
Trientalis arctica	

FRESHWATER WETLAND COMMUNITIES

Freshwater wetlands are those which have no marine derived salts, and very little sphagnum, either living or in the soils. The pH is greater than 5.5, either circumneutral or basic. They may be high or low nutrient systems.

Hippuris vulgaris community: This is a commonly occurring community found in shallow, permanently flooded areas. The community often appears to be monospecific, but detailed surveys have not been done.

Typical species:

Hippuris vulgaris 50%

Other species:

Nuphar polysepalum	Sparganium emersum
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Juncus balticus community: This community occurs in shallow water over silts or organic muck. It is usually monospecific, but contains several species in one wetland which has serpentine influence.

Typical species:

Juncus balticus 20%

Other species:

Carex cusickii
Carex obnupta
Carex oederi
Festuca rubra

Nuphar polysepalum
Potentilla pacifica
Triglochin maritimum

Nuphar polysepalum community: This is one of the most common communities in shallow, permanently flooded areas. It usually occurs in the rooted aquatic zone but extends into the emergent zone. It may be monospecific or composed of several aquatic plant species.

Typical species:

Nuphar polysepalum 10-90%

Other species:

Equisetum fluviatile
Hippuris vulgaris
Juncus balticus
Potamogeton natans

Scirpus subterminalis
Sparganium emersum
Utricularia vulgaris

Scirpus acutus community: This is a very common emergent community, though it may occupy small areas. It is found in shallow water, on very soft silts and organic muck. It occurs as almost pure stands of either Scirpus acutus or S. validus. The two species are very similar morphologically, and, because of the difficulty in walking on the substrates where they occur, S. acutus is used for both unless specified.

Typical species:

Scirpus acutus or S. validus 10-40%

Other species:

Nuphar polysepalum
Potentilla palustris

Spiraea douglasii

Scirpus subterminalis community: This community is found in very shallow permanent ponds. It occupies the first zone waterward of seasonally flooded areas, most frequently in wetlands with large

annual water level fluctuation. It is typically found associated with Spiraea douglasii sphagnum bogs, and may occur on muck, sedge peat, or a mixture of sedge and sphagnum peat.

Typical species:

Scirpus subterminalis 20-60%

Other species:

Nuphar polysepalum

Utricularia vulgaris

Typha latifolia community: This is a commonly occurring community, though it is difficult to distinguish between native and disturbance generated examples. It typically occurs as monospecific stands, in shallow permanently flooded areas, with organic soils. Occasionally it also occurs in seasonally flooded areas. Typha latifolia usually forms monospecific stands in permanently flooded areas and then it may occur with a large number of other species. The community is frequently located adjacent to other communities with which it merges, often forming complex ecotonal assemblages.

Typical species:

Typha latifolia 20-75%

Other species:

Alnus rubra

Mimulus guttatus

Carex cusickii

Myosotis laxa

Carex obnupta

Oenanthe sarmentosa

Carex rostrata

Potamogeton natans

Carex sitchensis

Potentilla palustris

Carex vesicaria

Puccinellia palustris

Galium trifidum

Sparganium emersum

Lemna minor

Spiraea douglasii

Lonicera involucrata

Veronica scutellata

Calamagrostis canadensis community: The C. canadensis community rarely occurs at low elevations. Where found at low elevations, it forms floating sedge mats which often intergrade with sphagnum mats.

The community is more common at elevations approaching mid-montane. At mid-elevations it occurs in seasonally flooded cold drainages with Carex rostrata and C. sitchensis communities, and some sphagnum bog vegetation.

Typical species:

Calamagrostis canadensis 75-95%

Other species:

Carex rostrata

Salix spp.

Carex sitchensis

Spiraea douglasii

Potentilla palustris

Typha latifolia

Carex cusickii community: This community occurs on floating mats, usually around lake margins. It is species rich and often contains some sphagnum moss (< 6% cover) and sphagnum associated plant species.

Typical species:

Carex cusickii 40-45%

Other species:

Agrostis scabra

Alnus rubra

Carex interior complex

Carex sitchensis

Cicuta douglasii

Drosera rotundifolia

Epilobium sp.

Galium spp.

Juncus balticus

Mentha arvensis

Menyanthes trifoliata

Mimulus guttatus

Myosotis laxa

Oenanthe sarmentosa

Potentilla palustris

Spiraea douglasii

Typha latifolia

Veronica americanum

Carex obnupta community: This is a commonly occurring community along the forested margins of wetlands. It is typically seasonally flooded, but may be permanently flooded. Substrates may be sedge peat (often with woody material), sands, or muck.

Typical species:

Carex obnupta 60-90%

Other species:

Carex cusickii

Ledum groenlandicum

Nuphar polysepalum

Oenanthe sarmentosa

Spiraea douglasii

Carex rostrata community: This is a species rich community which may be found in either seasonally or permanently flooded areas. Substrates are typically sedge peat, but may contain some sphagnum (< 10%).

Typical species:

Carex rostrata 50-80%

Other species:

Angelica genuflexa

Calamagrostis canadensis

Carex cusickii

Carex sitchensis

Cicuta douglasii

Epilobium sp.

Glyceria elata

Mimulus guttatus

Myosotis laxa

Oenanthe sarmentosa

Potentilla palustris

Puccinellia palustris

Galium spp.

Carex sitchensis community: This community occurs in seasonally to permanently flooded areas on sedge peat. It may occur as a monospecific sward or intermixed with several other freshwater wetland communities: C. rostrata, C. cusickii, Calamagrostis canadensis and Spiraea douglasii.

Typical species:

Carex sitchensis 30-70%

Other species:

Carex cusickii
Carex rostrata
Juncus balticus

Nuphar polysepalum
Potentilla palustris

Carex vesicaria community: This community occurs over glacial till or outwash, typically where there is very little organic matter. It usually occupies a zone just landward of permanently flooded areas, though occasionally it occurs in areas permanently flooded with shallow water. It is typically a monospecific community.

Typical species:

Carex vesicaria 25-65%

Other species:

Dulichium arundinaceum
Eleocharis palustris
Nuphar polysepalum
Potamogeton spp.

Puccinellia palustris
Ranunculus flammula
Sium suave
Sparganium spp.

Dulichium arundinaceum community: This community occurs over glacial till or outwash which has very little organic matter. It occupies either the permanently flooded, shallow water areas or seasonally flooded areas. It is nearly monospecific.

Typical species:

Dulichium arundinaceum 50-75%

Other species:

Carex vesicaria
Eleocharis palustris
Menyanthes trifoliata

Nuphar polysepalum
Potentilla palustris

Alnus sinuata community: This community has been insufficiently surveyed but is probably common in the glacial topography of the lowlands south of the Olympic Mountains. It may be associated

with low gradient or partially impounded streams. The areas are permanently flooded. Soils are thin layers of organic muck, woody material, and some sedge peat, overlaying gravelly outwash.

Typical Species:

Alnus sinuata 40%
Calamagrostis canadensis 15%
Carex sitchensis 10%

Other Species:

Carex cusickii	Potentilla palustris
Carex rostrata	Rhamnus purshiana
Cornus stolonifera	Salix spp.
Glyceria elata	Spiraea douglasii
Lysichitum americanum	Typha latifolia
Oenanthe sarmentosa	

Spiraea douglasii community: This community can be either seasonally or permanently flooded. Spiraea douglasii typically forms dense, nearly monospecific stands, 6-10 feet tall. Along the margins of these stands, and in less dense stands, may be found a large number of associated species. Soils are usually organic muck with some sedge peat and woody material.

Typical species:

Spiraea douglasii 20-100%

Other species:

Carex cusickii	Myosotis laxa
Carex obnupta	Oenanthe sarmentosa
Carex rostrata	Potentilla palustris
Carex sitchensis	Salix spp.
Cicuta douglasii	Sparganium spp.
Cornus stolonifera	Viola palustris
Glyceria elata	

Alnus rubra/Lysichitum americanum community: This community occurs near the wetland margin where soils are usually super-saturated and may be seasonally flooded. Soils are organic, usually overlying sands.

Typical species:

Alnus rubra 80%
Lysichitum americanum 35-60
Athyrum filix-femina 8-10%
Rubus spectabilis 5%

Other species:

Carex obnupta	Pteridium aquilinum
Cornus stolonifera	Pyrus fusca

Blechnum spicant
Impatiens capensis
Lonicera involucrata
Maianthemum dilatatum
Oenanthe sarmentosa
Picea sitchensis

Thuja plicata
Tiarella trifoliata
Tolmiea menziesii
Tsuga heterophylla
Vaccinium parvifolium

Alnus rubra/Rubus spectabilis community: This community is commonly occurring, though it is unusual to find examples which have not been disturbed by humans. It typically occurs along the upland margin of wetlands. Soils are organic, and are usually saturated year round. They may be flooded seasonally. Alnus rubra forms a closed canopy. Rubus spectabilis may be the only species in the understory.

Typical species:

Alnus rubra 40-80%
Rubus spectabilis 30-60%

Other species:

Athyrium filix-femina
Equisetum hyemale
Galium trifidum
Lonicera involucrata
Lysichitum americanum
Ribes sp.

Rubus ursinus
Sambucus racemosa
Thuja plicata
Tiarella trifoliata
Tolmiea menziesii
Tsuga heterophylla

Fraxinus latifolia community: This community occurs around the margins of wetlands. Soils may be thin over glacial till or outwash, or may have a relatively deep organic layer. These wetlands may be seasonally flooded or have a water table near the soil surface..

Typical species:

Fraxinus latifolia
Salix spp.

Other species:

Acer circinatum
Alnus rubra
Carex obnupta
Cornus stolonifera
Maianthemum dilatatum
Populus trichocarpa
Physocarpus capitatus

Pyrus fusca
Rhamnus purshiana
Rosa nutkana
Rubus spectabilis
Spiraea douglisii
Symphoricarpos alba

Pyrus fusca community: This community often encircles sphagnum bogs and kettle wetlands. It appears to occur over well drained

glacial till or outwash with a thin organic layer. It has almost no understory.

Typical species:

Pyrus fusca 30-80%

Other species:

<i>Alnus rubra</i>	<i>Rhamnus purshiana</i>
<i>Carex obnupta</i>	<i>Salix</i> spp.
<i>Lysichitum americanum</i>	<i>Spiraea douglasii</i>
<i>Maianthemum dilatatum</i>	<i>Trientalis arctica</i>

Tsuga heterophylla/Lysichitum americanum community: This community occurs on organic soils, where the water table is at or slightly below the surface. It occurs in cold drainages. Conifer species form an open canopy. Gaultheria shallon and Vaccinium alaskense are dominant over fallen logs and occasional mounds of soil. Lysichitum americanum is the dominant species between logs, where soils are permanently or seasonally flooded. Some Sphagnum moss is usually present.

Typical species:

Tsuga heterophylla 10-20%
Lysichitum americanum 20-30%
Gaultheria shallon 25-30%
Thuja plicata 5-10%
Sphagnum spp. 5%

Other species:

<i>Carex canescens</i>	<i>Lonicera involucrata</i>
<i>Carex leptalea</i>	<i>Maianthemum dilatatum</i>
<i>Carex rostrata</i>	<i>Menziesia ferruginea</i>
<i>Cornus canadensis</i>	<i>Picea sitchensis</i>
<i>Blechnum spicant</i>	<i>Rhamnus purshiana</i>
<i>Galium</i> spp.	<i>Sparganium</i> spp.
<i>Glyceria elata</i>	<i>Vaccinium alaskaense</i>
<i>Ledum groenlandicum</i>	<i>Vaccinium parvifolium</i>
<i>Lonicera involucrata</i>	

NON-RECURRING COMMUNITIES

LOW ELEVATION SPHAGNUM BOG COMMUNITIES

Carex sitchensis/Sphagnum spp. community: This community occupies very small areas and may be ecotonal. It typically occurs on firm substrates, but also may be found on quaking mats. It either forms dense monospecific stands or species rich swards. It is usually found intermixed with the Carex cusickii or Spiraea douglasii bog communities. Soils are a mixture of sedge and sphagnum peat, and are seasonally flooded.

Typical species:

Carex sitchensis 30-70%
Carex cusickii 15-20%
Potentilla palustris 5-30%

Other species:

Equisetum fluviatile	Menyanthes trifoliata
Galium sp.	Nuphar polysepalum
Kalmia occidentalis	Spiraea douglasii
Ledum groenlandicum	Vaccinium oxycoccos
Lysichitum americanum	Viola palustris
Mentha arvensis	

Pinus monticola/Ledum groenlandicum/Sphagnum spp. community:

This is a very rare community although it once may have been more common. It has been nearly eradicated through disease, timber harvest, and manipulation of its habitat. Remnant examples have scattered Pinus monticola and a tall, but open, shrub layer. This community occurs mostly in the southern Puget Trough region.

Typical species:

Pinus monticola 10-15%
Ledum groenlandicum 50-80%
Spiraea douglasii 5-10%

Other species:

Carex canescens	Pseudotsuga menziesii
Eriophorum chamissonis	Pteridium aquilinum
Gaultheria shallon	Tsuga heterophylla
Kalmia occidentalis	Vaccinium oxycoccos
Lysichitum americanum	Vaccinium parvifolium
Pinus contorta	

LOW ELEVATION FRESHWATER WETLAND COMMUNITIES

Potamogeton natans community: This community represents all rooted aquatic communities which have Potamogeton natans as a dominant species. This is an artificial community which, with further study, will be divided into several communities.

Typical species:

Ceratophyllum demersum
Potamogeton natans
Utricularia vulgaris

Other species:

Hippuris vulgaris

Carex spp. community: This community is only known from 1 site. It is permanently to semi-permanently flooded with water less than 1 foot deep. The community is probably ecotonal between a sphagnum bog and freshwater wetland. There is only about 10% cover of living sphagnum, and a mixture of typically sphagnum bog and freshwater wetland plant species.

Typical species:

Carex phyllomanica complex 15%
Scirpus microcarpus 15%

Other species:

Agrostis scabra	Juncus ensifolius
Angelica genuflexa	Juncus supiniformis
Athyrium filix-femina	Lycopus uniflorus
Carex canescens	Lysichitum americanum
Carex leptalea	Mimulus moschatus
Carex livida	Platenthera sp.
Carex obnupta	Puccinellia pauciflora
Carex rostrata	Ranunculus flammula
Drosera rotundifolia	Trisetum cernuum
Equisetum arvense	Vaccinium oxycoccos
Galium cymosum	Veronica scutellaria
Hypericum anagalloides	Viburnum sp.
Hypericum formosum	Viola sp.

Carex lasiocarpa community: This community can be monospecific. It is found in areas where it is seasonally flooded, on firm substrates or on quaking mats. The substrate is typically either sedge peat or a mixture of sedge and sphagnum peat.

Typical species:

Carex lasiocarpa 30-60%

Other species:

Carex sitchensis	Lysichitum americanum
Drosera rotundifolia	Nuphar polysepalum
Dulichium arundinaceum	Potentilla palustris
Hypericum anagalloides	Viola palustris

Carex livida community: This is a rare community. It is species rich and may include sphagnum moss. It occurs on sedge peat or a mixture of sedge and sphagnum peat.

Typical species:

Carex livida 35-75%

Other species:

Carex oederi Juncus supiniformis

Carex sitchensis
Drosera rotundifolia
Equisetum fluviatile
Juncus ensifolius

Rhynchospora alba
Tofieldia glutinosa
Trientalis arctica
Viola palustris

Carex scopulorum community: This is an unusual community, known from 1 site. It occurs on a seasonally wet and seasonally dry ridge in a kettle wetland. Soils are coarse glacial till, with very little organic matter.

Typical species:

Carex scopulorum 40%

Other species:

Agrostis scabra
Apocynum medium
Carex sp.

Mentha sp.
Veronica scutellaria

Glyceria elata community: Glyceria elata is a common component of freshwater wetlands, but it is seldom the dominant species over a large area. Occassionally it is dominant in very small seasonal ponds and backwater areas, in black, anoxic, muck soils.

Typical species:

Glyceria elata

Other species:

Carex vesicaria
Nuphar polysepalum
Puccinellia palustris

Sparganium emersum
Sium suave

Cornus stolonifera-Salix spp.-Spiraea douglasii community: This community is typically found in association with flowing water, but occassionally occurs as a dense shrub zone around the margins of impounded wetlands. It has not been characterized well due to the difficulty in conducting field surveys: the shrub vegetation is dense, and it is usually associated with deep water and soft muck soils. At Mud Lakes, the community occurs on the seasonally flooded slopes of kettle wetlands on glacial till.

Typical species:

Spiraea douglasii 30-60%
Salix spp. 30-50%
Cornus stolonifera 10-30%

Other species:

Carex obnupta
Carex sitchensis
Lysichitum americanum

Potentilla palustris
Puccinellia pauciflora
Rhamnus purshiana

Maianthemum dilatatum
Physocarpus capitatus

Scirpus microcarpus

Salix spp. community: All Salix dominated wetlands have been lumped into this one community because of the difficulties in species identification and site surveys. With further work, it will probably be divided into one or more recurring communities.

These wetlands are either permanently or seasonally flooded and occur on organic muck. The vegetation usually consists of several shrubby species forming a dense stand. There are several understory microenvironments related to water depth and substrate within the stand. These microhabitats support different plant species.

Typical species:

Salix spp. 20-60%
Spiraea douglasii 5-60%

Other species:

Alnus spp.
Athyrium filix-femina
Carex obnupta
Carex rostrata
Carex sitchensis
Cornus stolonifera
Glyceria elata
Lonicera involucrata
Lysichitum americanum

Maianthemum dilatatum
Oenanthe sarmentosa
Physocarpus capitatus
Potentilla palustris
Rhamnus purshiana
Sparganium spp.
Veronica scutellaria
Viola palustris

Spiraea douglasii/Apocynum medium community: This community is only known to occur in two sites, and these sites are adjacent to each other.

The community occurs on the steep sides of kettles on coarse textured glacial till. There is a very thin organic layer over the till. The area is seasonally flooded but then becomes very dry in the summer. The vegetation is short, 1-2 feet tall.

Typical Species:

Spiraea douglasii 70%
Apocynum medium 20%

Other Species:

Agrostis sp.
Botrichium sp.
Carex sp.

Galium cymosum
Rubus ursinus

Thuja plicata community: This community is difficult to characterize because there are very few remaining examples and those probably are not modal examples. Most of the examples of this community have been logged and the hydrology has been altered.

The community is a wet forest with organic soils. The water level varying between being at to slightly below the soil surface. Some examples are permanently flooded with trees occurring above the water level on mounds of soil and fallen trees.

Typical Species:

Thuja plicata
Gaultheria shallon

Other Species:

Alnus rubra	Picea sitchensis
Carex canescens	Rhamnus purshiana
Cornus canadensis	Salix spp.
Cornus stolonifera	Spiraea douglasii
Ledum groenlandicum	Tsuga heterophylla
Lonicera involucrata	Vaccinium parvifolium
Lysichitum americanum	