

VEGETATION SURVEY OF DELAWARE WATER GAP
NATIONAL RECREATION AREA

Final Report

by

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This is the final report on contract CX4000-9-003⁴ between the United States Department of the Interior, National Park Service, Mid-Atlantic Region and the Pennsylvania State University. The purpose of this research contract was to develop a vegetation map for the Delaware Water Gap National Recreation Area (DWGNRA).

Information Sources

Color infrared aerial photography at a scale of 1/12,000 was chosen as the primary information source for vegetation mapping. The necessary photography was flown on June 12, 1980 under a sub-contract with L. Robert Kimball & Associates, Consulting Engineers and Architects of Ebensburg, Pennsylvania. The resulting photographs are 9 $\frac{1}{2}$ - inch square format transparencies at a scale of 1/12,000. Quality of the photographs is good to excellent. The developed photographs were received by The Pennsylvania State University on July 7, 1980. The National Park Service requested the opportunity to have black and white copies of the photography made for operational use at DWGNRA before separation of the frames in the original roll. This request was accommodated, but resulted in an extension of time for completing the vegetation survey. The original photographs with permanent plastic jackets are being retained in the School of Forest Resources at The Pennsylvania State University, with the provision that the National Park Service will have access to them if special needs arise.

Field work was conducted for associating photographic signatures with vegetation types, and for verifying the accuracy of photointerpretation.

Vegetation Classification

The vegetation classification is based on height and cover dominance as interpreted from the aerial photographs. The first level of classification recognizes 9 vegetation cover types as set forth in Table 1. An upper-case/lower-case coding system is used to achieve a height breakdown of these cover types. Upper-case letters indicate that the dominant vegetation component has an average height in excess of 10 meters. Lower-case letters indicate that the dominant vegetation component has an average height less than or equal to 10 meters.

Table 1. Cover type classification and coding.

<u>Cover type</u>	<u>Code</u>
Agriculture	A
Brush	B
Deciduous trees	D
Coniferous trees	E
Herbaceous perennials	H
Impermeable substrate	M
Mixed deciduous-conifer	Q
Turfgrass	T
Water and wetland	W

The second character of a map code reflects crown closure percentage for the dominant element of the cover type, with the coding as shown in Table 2.

Table 2. Coding system for crown closure.

<u>Crown closure %</u>	<u>Code</u>
0 - 10	0
10 - 20	1
20 - 30	2
30 - 40	3
40 - 50	4
50 - 60	5
60 - 70	6
70 - 80	7
80 - 90	8
90 -100	9

The species composition of the height-dominant vegetation element in a cover type is indicated by lower-case letter codes following the numeric crown closure class. The species codes are given in Table 3.

Fractional codes are used to indicate the species composition of lesser vegetation. Any association with less than 50% crown cover has a slash followed by code letters denoting the species composition of the lesser vegetation.

Table 3. Coding system for species composition.

<u>Code</u>	<u>Common name</u>	<u>Scientific name</u>
as	American sycamore	<u>Platanus occidentalis</u> L.
bf	balsam fir	<u>Abies balsamea</u> (L.) Mill.
ba	bigtooth aspen	<u>Populus grandidentata</u> Michx.
bl	black locust	<u>Robinia pseudoacacia</u> L.
bu	butternut	<u>Juglans cinerea</u> L.
co	chestnut oak	<u>Quercus prinus</u> L.
eh	eastern hemlock	<u>Tsuga canadensis</u> (L.) Carr.
fd	flowering dogwood	<u>Cornus florida</u> L.
gb	gray birch	<u>Betula populifolia</u> Marsh.
ns	Norway spruce	<u>Picea abies</u> (L.) Karst
o	orchard	----
or	ornamental	----
pc	pin cherry	<u>Prunus pensylvanica</u> L.
qa	quaking aspen	<u>Populus tremuloides</u> Michx.
rc	redcedar	<u>Juniperus virginiana</u> L.
rm	red maple	<u>Acer rubrum</u> L.
ro	red oak	<u>Quercus rubra</u> L.
rp	red pine	<u>Pinus resinosa</u> Ait.
sb	sweet birch	<u>Betula lenta</u> L.
sp	scotch pine	<u>Pinus sylvestris</u> L.
sh	shagbark hickory	<u>Carya ovata</u> (Mill.) K. Koch
sim	silver maple	<u>Acer saccharinum</u> L.
sm	sugar maple	<u>Acer saccharum</u> Marsh
wa	white ash	<u>Fraxinus americana</u> L.
wo	white oak	<u>Quercus alba</u> L.
wp	white pine	<u>Pinus strobus</u> L.
ws	white spruce	<u>Picea glauca</u> (Moench) Voss
yb	yellow birch	<u>Betula alleghaniensis</u> Britton
yp	yellow-poplar	<u>Liriodendron tulipifera</u> L.

Survey Procedure

The initial step in the survey was random selection of 30 of the aerial photographs. For these sample photographs, boundaries between vegetation types were delineated on Mylar overlays under a mirror stereoscope. The signature of each vegetation unit was carefully described in terms of color, texture, etc. The sample of photographs was then taken into the field in order to correlate vegetation composition with signatures.

After the necessary correlations were developed, the remaining photographs were analyzed stereoscopically and vegetation mapped on Mylar overlays. Vegetation delineations and classifications were then transferred to a draft map. The draft map was field checked to verify the accuracy of photointerpretation, and corrections made as necessary.

The final map was prepared at a scale of 1/24,000 on Mylar, and multiple copies produced by photoduplication. Although the contract originally called for mapping at a scale of 1/12,000, the representative of the contracting agency requested a change to 1/24,000 so that the map would have the same scale as U.S.G.S. quadrangle maps. This request was honored in preparing the final product.

Format for Computer Coding

In addition to the actual map, the following format was set up for computer coding, with each line representing an area delineated separately on the map.

Columns 1 - 5:	Y-coordinate of approximate center.
Columns 6 - 10:	X-coordinate of approximate center.
Column 12:	1 = PA; 2 = NJ; 3 = Delaware river island.
Column 15:	0 = lower-case type code; 1 = upper-case type code.
Column 16:	Cover type code.
Columns 17 - 18:	Numeric crown closure, with 11 being no code.
Columns 20 - 22:	First species code.
Columns 24 - 26:	Second species code.
Columns 28 - 30:	Third species code.
Column 32:	0 = fractional code absent; 1 = fractional code present.
Columns 34 - 36:	First fractional species code.
Columns 38 - 40:	Second fractional species code.
Columns 51 - 60:	Area in hectares with decimal point punched.

Coding in this format permits further analysis of the mapped information through special purpose FORTRAN computer programs.

Delivery of Products

Products were delivered to Mr. John Karish of the Penn. State Cooperative Park Studies Unit on or before October 31, 1981.