ORBES

PENNSYLVANIA BASELINE

Part 2 - Impact Assessment Data Base

Chapter 1 - Characteristics and Human Utilization Of Natural Ecosystems

Section 4 - Terrestrial Ecology

PHASE II

OHIO RIVER BASIN ENERGY STUDY

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PENNSYLVANIA BASELINE

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Chapter 1 - Characteristics and Human Utilization Of Natural Ecosystems

Section 4 - Terrestrial Ecology

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2.1.4. TERRESTRIAL ECOLOGY

2.1.4.1. VASCULAR FLORA

A. Prehistoric Forest Composition

Subsequent to the final retreat of the ice from the Wisconsin Glaciation, Pennsylvania was subjected to a series of definite climatic fluctuations (1,2). Indeed, pollen studies (3,4,5) have indicated that five different postglacial, climatic periods occurred in this region. Generalized temperature and humidity regimes have been inferred (3,6) from the dominant forest associations as follows:

I. Following the retreat of ice, a spruce-fir forest (moist and cool climate)

II. A pine forest with substantial quantities of oak (dry, probably warmer climate)

III. An oak-beech-hemlock forest (moist and warm climate)

IV. An oak-hickory forest (dry and distinctly warm climate)

V. The present - oaks, beech, and hemlock prominent (more available moisture and probably cooler)

Approximately, four thousand years ago, during the warm and dry postglacial period IV, a "prairie peninsula" extended from the Mississippi River eastward through the state of Ohio (7). Certain species of prairie plants indigenous to the western U.S. are believed to have utilized this peninsula as a migratory route to the east (6, 7, 8). Even today, relict populations of the blazing star (*Liatris spicata*), a prairie flower, exist in northwestern Butler County at the Jennings Blazing Star Nature Reserve (8, 9) and a few miles to the east along what were the shores of glacial Lake Arthur (10). Other prairie plants which still inhabit western Pennsylvania include: gray-headed coneflower (*Ratibidia pinnata*), green milkweed (*Asclepias viridiflora*), false boneset (*Kuhnia eupatoriodes*), and big bluestem grass (*Andropogon furcatus*) (9, 10).

Although the prairie community is a negligible floristic group in our region today, the same xerothermic climatic period that favored its development also favored a northeastern migration of the white oak-hickory forest association into Pennsylvania (11). This forest is still the dominant association on the hilltops and uplands in the southwestern portion of the state.

B. Pre-settlement Forest Composition

The "potential natural vegetation" of western Pennsylvania

has been mapped (Fig. 2.1.4.-1) along with the rest of the coterminous United States (12). This format presents a representation of the plant life"...that would exist today if man were removed from the scene and if the resulting plant succession were telescoped into a single moment." Emphasis has been placed on this denotation of "potential natural vegetation" because the exact influence of the American Indian upon forest composition and species distribution, although often assumed to be minimal, is unknown. It is known that the Indians often set fire to the woods to increase berry production, facilitate travel, and increase visibility (perhaps as an aid in hunting). Furthermore, many Indian tribes were nomadic, so that the total land area affected was considerably larger than would be expected (13). It has been speculated that the presence of oak forest along the Allegheny River and its tributaries is the result of fires set by Indians (14). Nonetheless, it has been estimated that more than 97% of the total state acreage was forested before the coming of the white man (15). The major non-forested areas are believed to have been a few natural meadows and extremely rugged mountain tops.

In spite of the scarcity of information regarding pre-settlement vegetation, it is known that many of the trees common today were also prevalent at the time of European colonization. Hough and Forbes (16) recognized three basic types of stands in the pre-settlement Allegheny High Plateau* region: white pine, hemlock-beech, and beech-maple. Early Pennsylvania pioneers were known to have utilized several types of trees including: maple (Acer) for sugar and timber; white oak (Quercus alba) for the construction of cabins; other oak species for firewood and fencing; chestnut (Castanea dentata) for fencing; walnut (Juglans) for gun stocks; and hickory (Carya), though not abundant, for fashioning farm tools and wagon axles (17). The presence and relative abundance of these trees in Pennsylvania at the time of European colonization suggests that Kuchler's map of potential vegetation is a reasonable approximation of pre-settlement species with the notable exception of chestnut. The association that Kuchler designates as Appalachian Oak Forest (Fig. 2.1.4.-1; Table 2.1.4.-1) was actually an oak-chestnut (Quercus - Castanea) forest prior to the chestnut blight of the early twentieth century (6). In fact, chestnut may have been the most common tree in pre-settlement Pennsylvania (18).

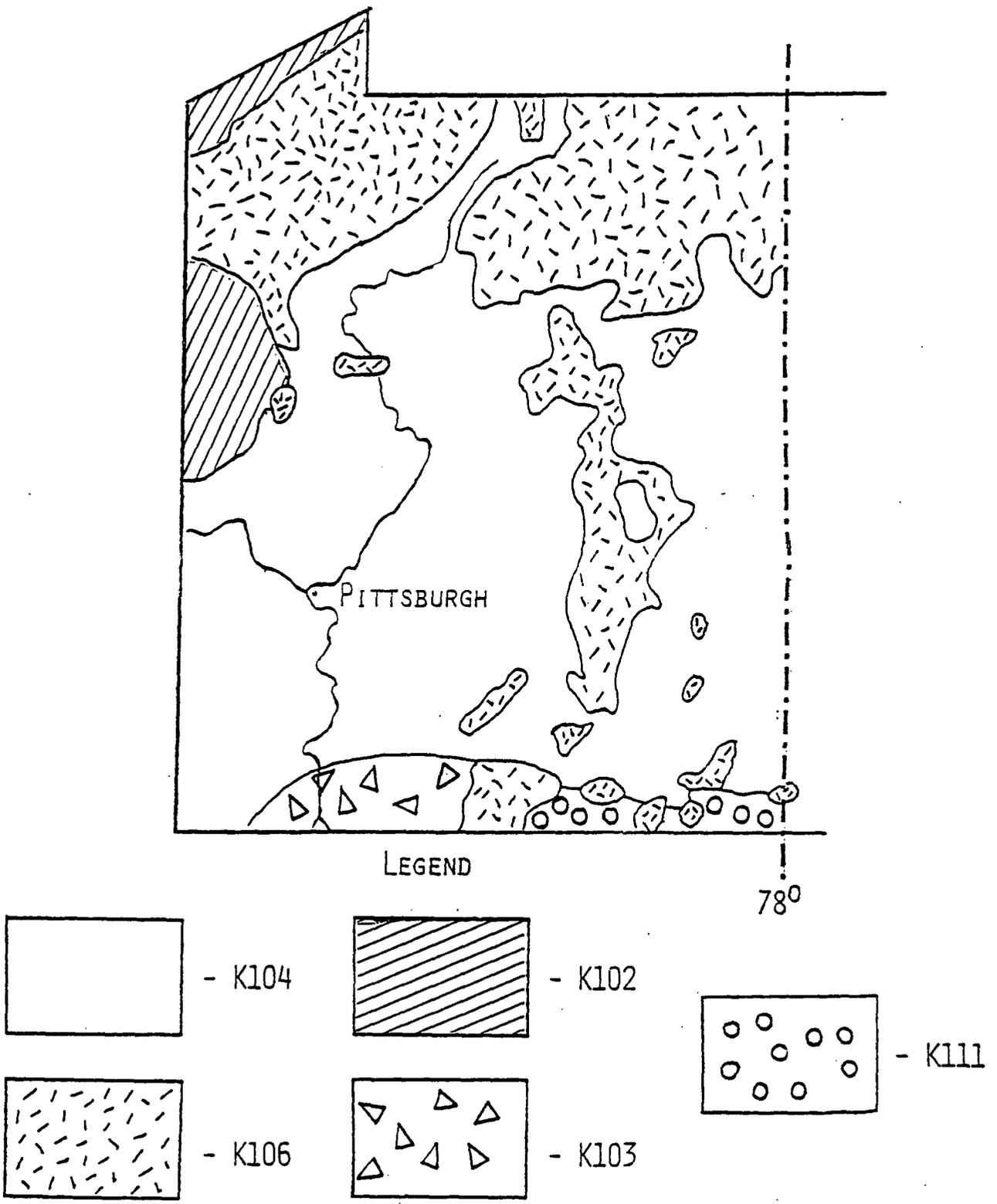
C. Past Impacts

The Pennsylvania lumber industry had its origins in the eastern portion of the state prior to the 1682 arrival of William Penn.

*Venango, Forest, Elk, Upper Jefferson, Clearfield, and Clarion Counties are the Pennsylvania ORBES counties contained within this physiographic section.

FIGURE 2.1.4.-1

POTENTIAL NATURAL VEGETATION OF WESTERN PENNSYLVANIA



LEGEND: FOR DESCRIPTION OF K-TYPES SEE TABLE 2.1.4.-1
SCALE: 40 MILES TO THE INCH
SOURCE: ADAPTED FROM KUCHLER (12).

TABLE 2.1.4.-1

POTENTIAL NATURAL VEGETATION
OF THE ORBES-PENNSYLVANIA
STUDY REGION
(KÜCHLER TYPES)

K102. Beech - Maple Forest (Fagus - Acer)

Physiognomy: Sugar maple (Acer saccharum); Beech (Fagus grandifolia).

Associated Species: Ohio buckeye (Aesculus glabra); Shagbark hickory (Carya ovata); White ash (Fraxinus americana); Black walnut (Juglans nigra); Tulip tree (Liriodendron tulipifera).

K103. Mixed Mesophytic Forest (Acer - Aesculus - Fagus - Liriodendron Quercus - Tilia)

Physiognomy: Tall, broadleaf deciduous forest.

Dominants: Sugar maple (Acer saccharum); Beech (Fagus grandifolia); Basswood (Tilia heterophylla); Tulip tree (Liriodendron tulipifera); Sweet buckeye (Aesculus octandra); Northern red oak (Quercus rubra); White oak (Q. alba).

Associated Species: Service-berry (Amelanchier arborea); Black birch (Betula lenta); American hornbeam (Carpinus caroliniana); Bitternut (Carya cordiformis); Pignut (C. glabra); Shagbark hickory (C. ovata); Redbud (Cercis canadensis); Flowering dogwood (Cornus florida); White ash (Fraxinus americana); Black walnut (Juglans nigra); Cucumber tree (Magnolia acuminata); Umbrella tree (Magnolia tripetala); Black gum (Nyssa sylvatica); American Hop Hornbeam (Ostrya virginiana); Sourwood (Oxydendrum arboreum); American basswood (Tilia americana); Hemlock (Tsuga canadensis).

K104. Appalachian Oak Forest (Quercus)

Physiognomy: Tall broadleaf deciduous forest.

TABLE 2.1.4.-1
Continued

Dominants: White Oak (Quercus alba); Northern Red Oak (Quercus rubra).

Associated Species: Red maple (Acer rubrum); Sugar maple (A. saccharum); Black birch (Betula lenta); Bitternut (Carya cordiformis); Pignut (C. glabra); Mockernut (C. tormentosa); Chestnut (Castanea dentata) formerly a co-dominant but now insignificant; Beech (Fagus grandifolia); Tulip tree (Liriodendron tulipifera); White Pine (Pinus strobus); Scarlet oak (Quercus coccinea); Black oak (O. velutina); and Hemlock (Tsuga canadensis).

K106. Northern Hardwoods (Acer - Betula - Fagus - Tsuga)

Physiognomy: Tall, broadleaf deciduous forest with an admixture of needleleaf evergreen trees.

Dominants: Sugar maple (Acer saccharum);Yellow birch (Betula allegheniensis); Beech (Fagus grandifolia); Hemlock (Tsuga canadensis).

Associated Species: Striped maple (Acer pennsylvanicum); Red maple (A. rubrum); Mountain maple (A. spicatum); White ash (Fraxinus americana); Mountain laurel (Kalmia latifolia); White pine (Pinus strobus); Wild black cherry (Prunus serotina); Basswood (Tilia americana); American elm (Ulmus americana).

K111. Oak - Hickory - Pine (Quercus - Carya - Pinus)

Physiognomy: Medium tall to tall forest of broadleaf deciduous and needleleaf evergreen trees

Dominants: Hickory (Carya sp.); Shortleaf Pine (Pinus echinata); Loblolly Pine (Pinus taeda); White oak (Quercus alba); Post oak (Q. stellata).

Associated Species: Bitternut (Carya cordiformis); Pignut (C. glabra); Shagbark hickory (C. ovata); Flowering dogwood (Cornus florida); Tulip tree (Liriodendron tulipifera); Black gum (Nyssa sylvatica); Virginia pine (Pinus virginiana); Scarlet oak (Quercus coccinea); Black oak (Q. velutina).

SOURCE: Küchler (12)

Sawmills did not become established in the Pennsylvania ORBES region until 1776 (Allegheny County), 1805 (Clarion County) and 1825 (Elk County). The industry enjoyed increasing total lumber productivity after the Civil War. National demand for lumber soared at this time due to intensive rebuilding efforts (19). The strain on Pennsylvania's forest resources was augmented by exportation to foreign markets that "...clamored for our forest products, the finest trees and lumber to be purchased on the world's market" (20).

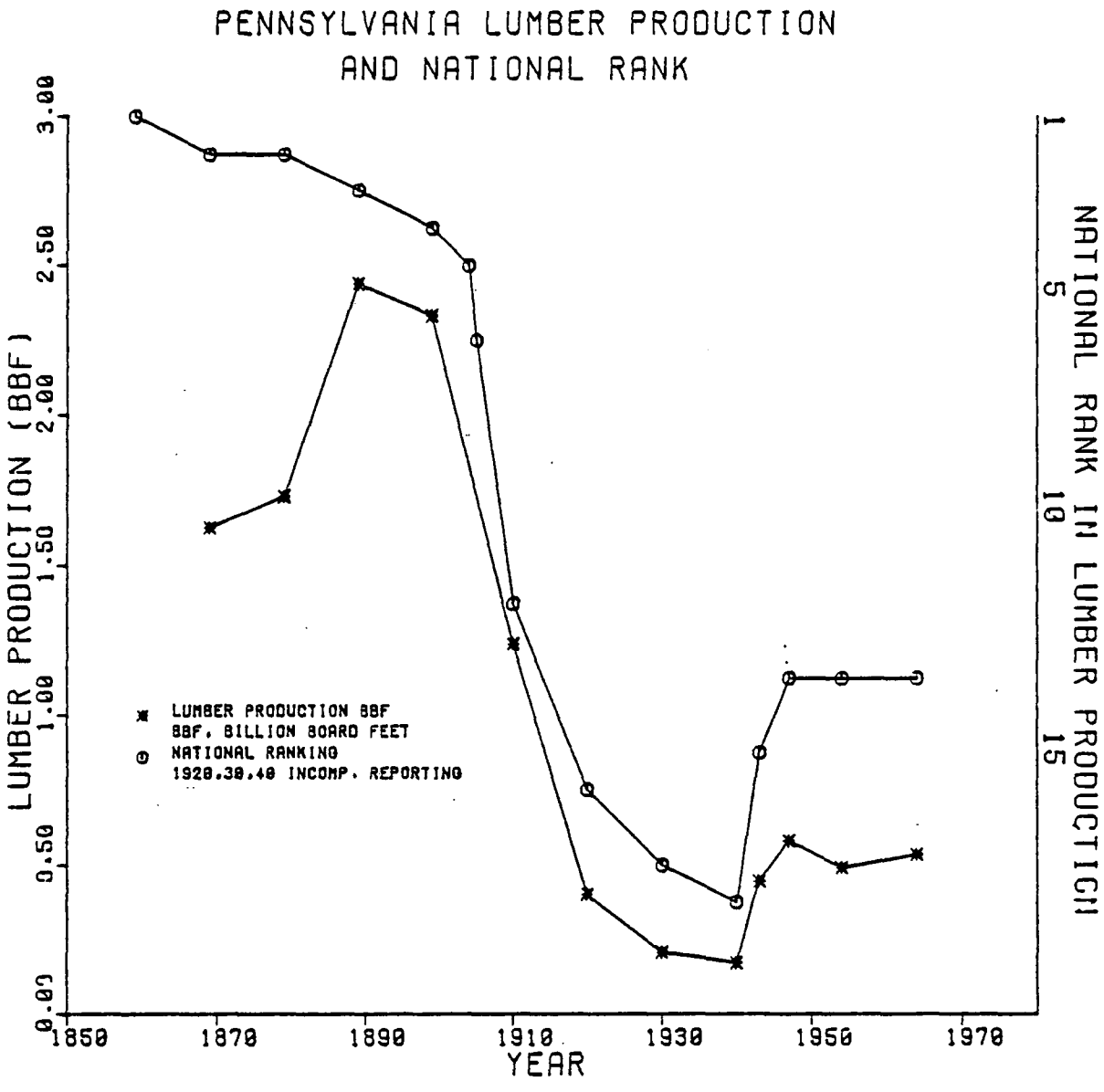
This overzealous lumbering had deforested much of Pennsylvania by the beginning of the twentieth century. Marquis (14) notes that "between 1890 and 1920," the virgin and partially cut forests were almost completely clear-cut in what must have been the highest degree of forest utilization the world has ever seen in any commercial lumbering area." In addition, the presence of good farming soils in western Pennsylvania and the proximity of the area to a big market place (Pittsburgh) further prompted the clearing of forested lands during the nineteenth century. The industrialization and urbanization of Allegheny County also resulted in the deforestation of considerable tracts of land in the southwestern corner of the Commonwealth. The surface mining of coal has been, and continues to be, an activity which temporarily removes parcels of land from the forested condition.

The sharp decline in total lumber production (Fig. 2.1.4.-2) evident throughout the early 1900's was due to a decrease in softwood production. Softwood constituted as much as three-fourths of the total lumber production in the late 1800's, but had plummeted to less than one-fourth of the total by 1969 (24). Pine and hemlock comprised the bulk of softwood used as lumber during this period. Table 2.1.4.-2 delineates hard- and softwood species found on commercial forest lands in Pennsylvania.

Hardwood production has remained relatively constant over the last century. Although Pennsylvania was nationally ranked sixteenth in total lumber production for 1969 (see Fig. 2.1.4.-2), it merited second place in hardwood production for the same year. Consequently, the decline in national rank for total lumber production was due to a combination of excessive softwood harvesting and the expansion of the lumber industry in the Pacific Northwest.

Our forest lands are still well suited for timber production. Approximately 98% of the state is theoretically capable of growing commercial timber (27). The net volume of total growing stock on commercial forest land within the Pennsylvania ORBES region in 1965 amounted to 5.15 billion cubic feet or 28.9% of the state total. Modern forest management and controlled harvesting has greatly improved the quantity and quality of Pennsylvania's forested lands. Between the 1955 and 1965 forest surveys, the statewide average for annual net growth of the growing stock (615 million cubic feet) was three times the cut (204 million cubic feet) (25). Six of the top ten lumber harvest counties

FIGURE 2.1.4.-2



Adapted from data in Pa. Dept. of Commerce (21) and Reynolds and Pierson (22) with corrections by the U.S. Forest Service (23)

TABLE 2.1.4.-2

LIST OF COMMERCIAL TREE SPECIES FOUND ON FOREST SURVEY SAMPLE PLOTS IN THE STATE OF PENNSYLVANIA

SOFTWOODS	
Virginia pine	*Pinus virginiana*
Other yellow pines:	
Pitch pine	*Pinus rigida*
Table-Mountain pine	*Pinus pungens*
Eastern white pine	*Pinus strobus*
Red pine	*Pinus resinosa*
Eastern hemlock	*Tsuga canadensis*
Other softwoods:	
Spruce	*Picea* sp.
Tamarack	*Larix laricina*
Eastern redcedar	*Juniperus virginiana*
Northern white-cedar	*Thuja occidentalis*
HARDWOODS	
Select white oaks:	
White oak	*Quercus alba*
Swamp white oak	*Quercus bicolor*
Bur oak	*Quercus macrocarpa*
Select red oaks:	
Northern red oak	*Quercus rubra*
Other white oaks:	
Chestnut oak	*Quercus prinus*
Post oak	*Quercus stellata*
Other red oaks:	
Black oak	*Quercus velutina*
Scarlet oak	*Quercus coccinea*
Pin oak	*Quercus palustris*
Willow oak	*Quercus phellos*
Hickory	*Carya* sp.
Yellow birch	*Betula allegheniensis*

TABLE 2.1.4.-2 (Cont.)

Sugar maple	*Acer saccharum*
Soft maples:	
Red maple	*Acer rubrum*
Silver maple	*Acer saccharinum*
American beech	*Fagus grandifolia*
Blackgum	*Nyssa sylvatica*
Sweetgum	*Liquidambar styraciflua*
Ash	*Fraxinus* sp
Aspen	*Populus* sp.
American basswood	*Tilia americana*
Yellow-popular	*Liriodendron tulipifera*
Black walnut	*Juglans nigra*
Black cherry	*Prunus serotina*
American sycamore	*Platanus occidentalis*
Black locust	*Robinia pseudoacacia*
Other hardwoods:	
Butternut	*Juglans cinerea*
Cucumbertree	*Magnolia acuminata*
Elm	*Ulmus* sp.
Flowering dogwood	*Cornus florida*
Paper birch	*Betula papyrifera*
Sweet birch	*Betula lenta*
Willow	*Salix* sp.
Yellow buckeye	*Aesculus octandra*

SOURCES: Ferguson (25); Little (26)

(total lumber) were contained within the ORBES region in 1964 (see Table 2.1.4.-3). Somerset County is an exceptionally important harvest site; it yields substantial quantities of a wide variety of tree types. Several counties with high human population densities (Allegheny, Beaver, Lawrence, and Washington) have low growing stocks and consequently are of minimal importance as lumber producers. Conversely, Elk County has a very high growing stock (608.4 million cubic feet) and yet it is harvested for only small to modest quantities of timber.

D. Current Degree of Forestation

At the present time, forested lands are defined as those areas in which: (a) at least ten percent of the land is stocked with trees of any size and are capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than ten percent stocking and that has not been developed for other use; and (c) afforested areas. Forest tracts of less than one acre, isolated strips of timber less than one hundred and twenty feet wide, and abandoned fields and pastures not yet stocked to ten percent with trees are not considered to be forested lands.

Surprisingly, the amount of forested land in the entirety of the Pennsylvania ORBES region has been increasing during the last century (see Fig. 2.1.4.-3). The highest rate of increase (sharpest slope) in Figure 2.1.4.-3 occurs during the 1950's and 60's. This dramatic increase has been ascribed to a widespread abandonment of cropland and treeless pasture land due to the migration of much of the agriculture industry to the midwestern states (25).

Not only has the totality of the Pennsylvania ORBES region undergone a reforestation, but each of the individual counties within the region have also experienced increases in forested land (see Table 2.1.4.-4). The current degree of county-specific forestation is depicted in Figure 2.1.4.-4.

E. Modern Forest Composition

The four generalized forest associations depicted in Figure 2.1.4.-1 and Table 2.1.4.-1 roughly approximate the major forest communities present in our region today. However, the characterization of the majority of the Pennsylvania ORBES region as either Appalachian Oak Forest (12) or Mixed Mesophytic Forest (6) is an oversimplification. Localized variations in abiotic factors (climate, soils, etc.) have permitted considerable interdigitation and mixing of forest types. Furthermore, the land-use variations imposed by man have severely limited certain types and have largely restricted endemic species to areas of rugged topography. The available data from both old growth stands and mature second growth stands indicates that dry, upland areas are oak-

TABLE 2.1.4.-3

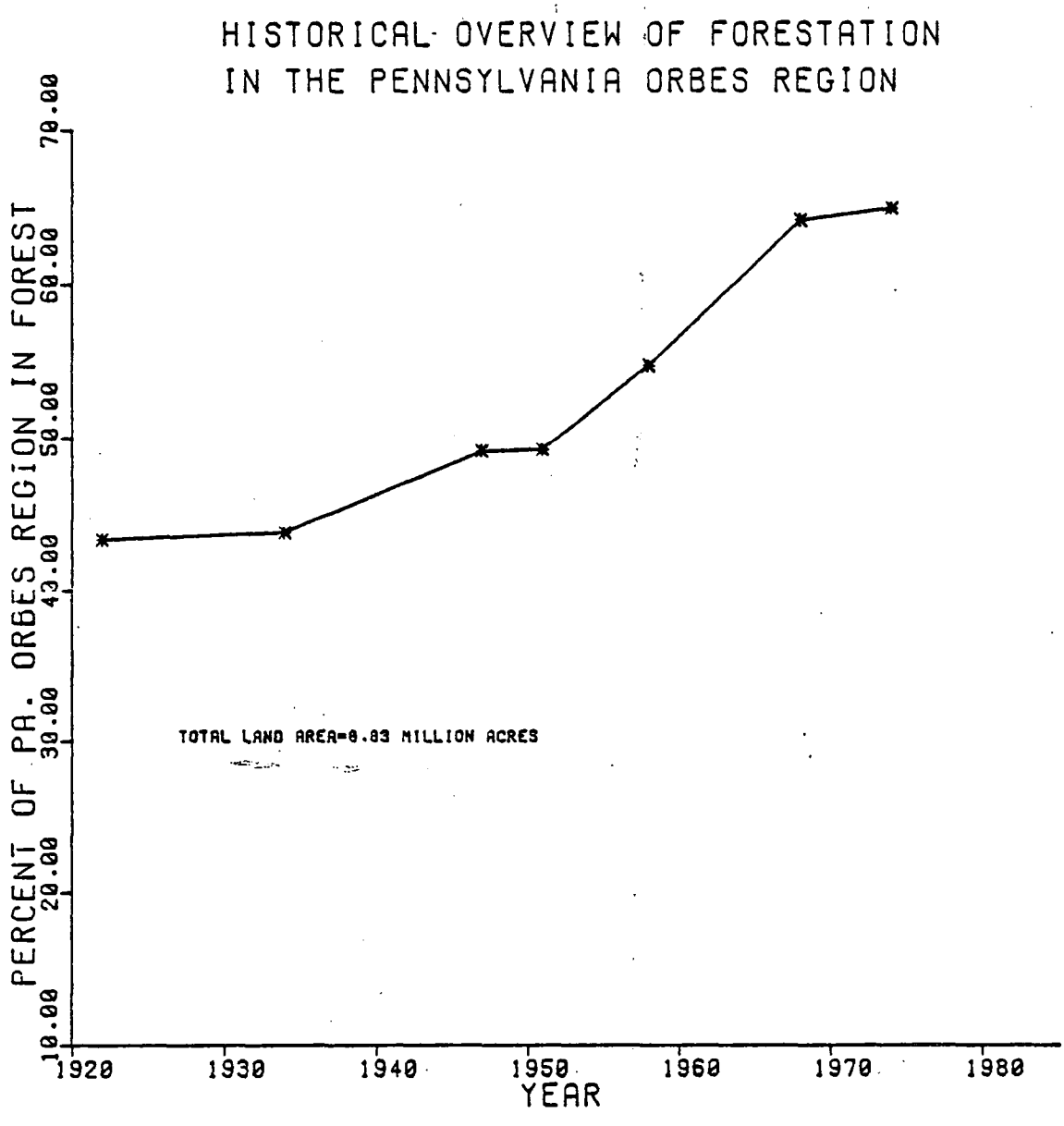
1964 HARVEST RANKINGS FOR ORBES COUNTIES AMONG THE TOP TEN COUNTIES IN THE STATE

	Ash	Basswood	Beech	Birch	Black Cherry	Hickory	Hard Maple	Soft Maple	White Oak	Red Oak	Yellow Poplar	Black Walnut	White Pine	Yellow Pine	Hemlock	Total Lumber
ALLE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARMS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BEAV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BUTL	-	-	-	4	5	7	-	-	-	-	-	-	-	-	-	-
CAMB	-	-	3	-	-	-	-	7	-	-	-	-	-	9	-	-
CLAR	-	-	-	-	-	-	-	6	6	1	-	1	-	-	7	4
CLEA	-	-	-	-	10	-	-	-	-	7	-	-	2	6	1	8
ELK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FAYE	-	3	-	-	-	10	-	-	-	9	1	9	-	-	-	5
FORE	-	-	10	-	7	-	-	8	-	-	-	-	9	-	-	-
GREE	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-
INDI	7	-	-	-	-	-	-	-	-	8	6	-	-	-	-	9
JEFF	-	-	-	-	8	-	-	9	-	4	-	-	-	-	-	10
LAWR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MERC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SOME	4	4	-	9	3	1	5	2	8	2	2	-	-	-	-	2
VENA	-	-	-	-	-	-	-	5	2	3	-	-	-	-	-	-
WASH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WEST	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-

(-) County was not ranked among top ten

SOURCE: Pa. Dept. of Commerce (21).

FIGURE 2.1.4.-3



SOURCES: Adapted from data in Table 2.1.4.-4.

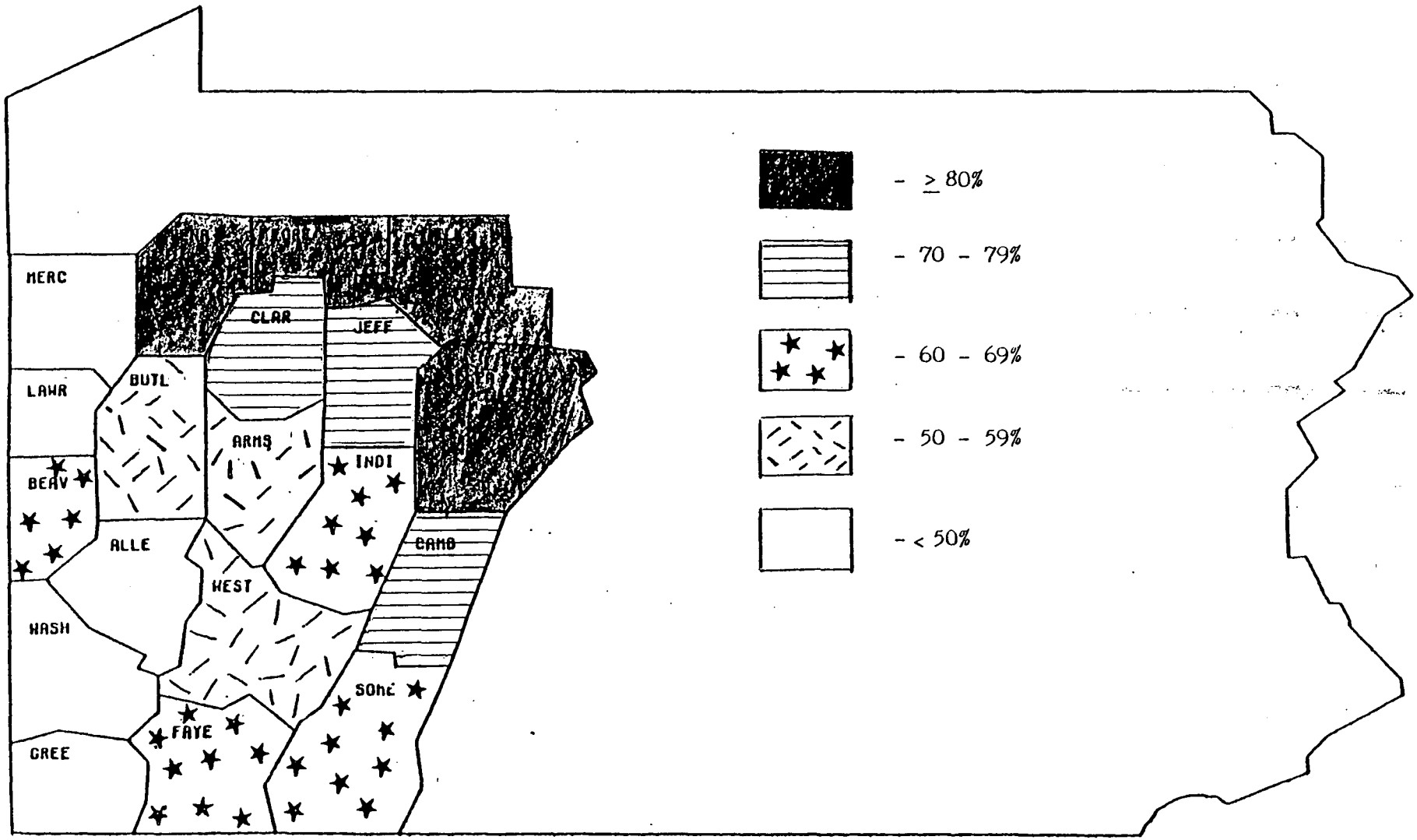
TABLE 2.1.4.-4

HISTORICAL TRENDS IN COUNTY-SPECIFIC FORESTATION
(ACRES X 1,000)

COUNTY NAME	TOTAL LAND ACRES	ESTIMATED FOREST ACREAGE YEAR							ESTIMATED PERCENTAGE FORESTED YEAR						
		1922	1934	1947	1951	1958	1968	1974	1922	1934	1947	1951	1958	1968	1974
ALLE	465.9	109.2	74.6	135.0	147.5	171.4	191.2	206.3	23.4	16.0	29.0	31.7	36.8	41.0	44.3
ARMS	417.3	127.9	127.9	198.1	170.7	211.7	233.6	234.7	30.6	30.6	47.5	40.9	50.7	56.0	56.3
BEAV	281.6	77.4	77.4	104.4	100.4	116.7	163.1	179.3	27.5	27.5	37.1	35.7	41.4	57.9	63.7
BUTL	508.2	105.6	150.8	156.4	192.0	202.8	284.9	292.5	20.8	29.7	30.8	37.8	39.9	56.1	57.6
CAMB	442.9	257.0	249.3	270.7	259.0	315.5	308.4	319.7	58.0	56.3	61.1	58.5	71.2	69.6	72.2
CLAR	382.1	153.0	159.3	193.2	189.6	204.9	290.8	291.6	40.0	41.7	50.6	49.6	53.6	76.1	76.3
CLEA	729.0	500.0	535.8	527.5	541.5	603.4	643.5	644.8	68.6	73.5	72.4	74.3	82.8	88.3	88.4
ELK	516.5	417.0	443.5	458.4	456.3	447.9	480.6	481.1	80.7	85.9	88.8	88.3	86.7	93.1	93.2
FAYE	513.3	335.0	238.0	297.0	264.5	326.4	351.2	355.0	65.3	46.4	57.9	51.5	63.6	68.4	69.2
FORE	268.2	233.6	236.2	245.5	247.8	242.5	250.6	250.3	87.1	88.1	91.5	92.4	90.4	93.4	93.3
GREE	369.9	89.4	47.9	90.7	115.5	137.8	157.0	158.1	24.2	12.9	24.5	31.2	37.2	42.4	42.7
INDI	528.0	176.0	212.4	249.4	221.7	253.7	316.9	316.7	33.3	40.2	47.2	42.0	48.0	60.0	60.0
JEFF	417.3	221.0	233.6	232.1	283.4	262.9	314.1	317.4	53.0	56.0	55.6	67.9	63.0	75.3	76.1
LAWR	234.9	49.0	43.0	40.2	50.3	55.2	101.9	102.2	20.9	18.3	17.1	21.4	23.5	43.4	43.5
MERC	428.8	106.7	98.4	97.0	86.6	93.7	166.4	168.1	24.9	22.9	22.6	20.2	21.8	38.8	39.2
SOME	689.9	400.0	354.3	372.8	379.0	433.8	467.0	466.8	58.0	51.4	54.0	54.9	62.9	67.7	67.7
VENA	433.9	176.0	251.3	239.3	278.8	296.0	371.4	372.3	40.6	57.9	55.2	64.3	68.2	85.6	85.8
WASH	548.5	76.9	98.2	129.5	122.8	132.1	213.0	215.0	14.0	17.9	23.6	22.4	24.1	38.8	39.2
WEST	655.4	215.5	242.1	302.7	239.1	317.1	354.7	362.7	32.9	36.9	46.2	36.5	48.4	54.1	55.3
TOTAL	8831.6	3826.2	3874.0	4339.9	4346.5	4825.5	5660.3	5734.6	43.3	43.9	49.1	49.2	54.6	64.1	64.9

SOURCES: Adapted from data in Illick (28); Pa. Dept. of Forests and Waters (29); U.S. Forest Service (30); Soil Conservation Service (31).

FIGURE 2.1.4. - 4
PERCENT OF COUNTY LAND
IN THE FORESTED CONDITION
PENNSYLVANIA ORBES REGION - 1974



Source: Adapted from data in Table 2.1.4. - 4

dominated, whereas moist slopes and gentle river valleys are mixed mesophytic or occasionally beech-maple. The hemlock-hardwood association can still be found on steep ravines and plateau summits (32).

The Allegheny, Monongahela, and Ohio Rivers course through a belt of low hills. The flood plain and riparian vegetation cradled by these hills includes: silver maple, willow, sycamore, American elm, sweet gum, cottonwood, and river birch. Patches of alder and bands of red maple are also important constituents. Secondary growth stands are comprised of beech, white oak, black oak, and hickory. The old valley flatland areas are forested with pin oak, sweet gum, and red maple. The dry sections of this flatland contain considerable numbers of tulip tree, white oak, and beech. The developmental sequence for the remnants of the primary communities appears to be as follows:

pin oak ⟶ sweet gum ⟶ red maple ⟶
beech ⟶ red maple ⟶ sweet gum ⟶
beech (33, 34).

The upland areas along the Ohio River are typically dominated by oak-hickory associations. The same situation is true of such areas along the middle and lower reaches of the Allegheny and Monongahela Rivers.

The land surrounding the headwaters of the Allegheny River is dominated by northern hardwood species. Similarly, the drainage basins of the major tributaries are vegetated with typical species of the Northern Hardwood Forest Association (K106). Yellow birch and sugar maple are common. Tulip trees are frequently encountered on the southern range of the Allegheny Plateau and Mountains. Secondary oak stands are common around the periphery of the plateau. Although the northern forest of this region has been modified by lumbering activities and the intrusion of more southern tree species, the original forest in Cook Forest State Park has been preserved. This large, virgin forest borders the Clarion River and contains approximately equal numbers of white pine and hemlock. This primeval forest association has been designated as a national natural landmark by the National Park Service.

Lumbering and other human activities have eliminated much of the Mixed Mesophytic Forest Association (K103) from our area. Tracts of land in the vicinity of the Upper Monongahela River, in addition to the eastern slope and valleys of the Allegheny Front, support remnant examples of this association. Ohiopyle State Park along the Upper Youghiogheny River contains an especially representative example of the mixed mesophytic type. A hemlock-white pine-northern hardwoods association also exists in the Ohiopyle region; it intergrades and interfingers with the more southern mesophytic forest. This mixing and interdigitation of forest types is more characteristic of our middle and southern latitudes, where the north-south trends in mountain ridges and valleys induce

relative uniformity in climate and soil types. Individual plant species and entire forest associations thereby have access to a continuous migratory route (6, 9).

Commercial forest lands consist of those areas which: (a) are producing, or are potentially capable of producing, usable crops of wood; (b) are economically available now or prospectively; and (c) are not withdrawn from timber utilization. This definition encompasses the overwhelming majority of all forested land in Pennsylvania. Indeed, approximately 98% of all forested land within Pennsylvania ORBES region is deemed to be commercial forest (21). The ownership of commercial forest lands within the Pennsylvania ORBES region is delineated in Table 2.1.4.-5. Table 2.1.4.-6 describes the principal tree associations which occur on our commercial forest lands within each of the nineteen Pennsylvania ORBES counties. Table 2.1.4.-7 quantitatively distributes these association types within each of the nineteen Pennsylvania ORBES counties. A simplified overview of modern association dominance is presented in Figure 2.1.4.-5.

F. Herbaceous Flora of the Forest

Irrespective of association type, the mature forests of our region are characterized by an almost continuous crown cover with little solar radiation reaching the forest floor. Consequently, understory shrubs and herbs undergo maximal growth during the spring. Magnificent woodland flowers such as spring beauty, trillium, hepatica, anemone, and violets are typical woodland flowers. Flowering shrubs such as azalea, mountain laurel, and rhododendron are also aesthetic treasures of this region. Many of our flowering plants are currently on the endangered species list (Table 2.1.4.-8). This is especially true of the orchids (Family Orchidae).

G. The Field Community

The clearing of Pennsylvania's forests for agriculture established numerous grasslands and fields during the last century, especially in the counties of Somerset, Butler, Washington, Westmoreland, Mercer, and Indiana. Herbaceous species such as goldenrods (*Solidago*) and other members of the aster family, which prefer open, sunny areas, are believed to be more abundant today than in pre-settlement times. Dewberries and black raspberries (*Rubus*) are also characteristic of our field communities. These fruits serve as food for a wide variety of wildlife. However, the overwhelming majority of Pennsylvania's grasslands and fields are merely transitional communities which, if left undisturbed, will eventually revert to secondary woodland.

H. Endangered Plant Species

"The Endangered Species Act of 1973" (PL 93-205) directed

TABLE 2.1.4.-5

OWNERSHIP[1] OF COMMERCIAL FOREST LANDS
IN ORBES-PENNSYLVANIA
(thousands of acres)

COUNTY	ST. FOR.	GM. LAND	NAT. FOR.	FOR. IND.[2]	FARM[3]	OTHER	T.C.F.A.
ALLE	0	1.1	0	0	8.0	163.4	172.5
ARMS	0	2.0	0	0.5	35.2	172.3	210.0
BEAV	0	1.3	0	0	20.5	104.5	126.3
BUTL	0	2.0	0	0	35.6	215.1	252.7
CAMB	0.2	17.3	0	9.6	36.8	214.4	278.3
CLAR	0	11.0	0	17.4	45.8	184.1	258.3
CLEA	74.2	24.7	0	12.7	35.1	430.5	577.2
ELK	66.1	59.6	113.3	45.7	12.8	178.6	476.1
FAYE	14.5	10.9	0	0.7	42.3	248.3	316.7
FORE	2.1	7.8	110.6	33.4	7.1	92.3	253.3
GREE	0	3.4	0	0.1	40.6	140.9	185.0
INDI	0.5	4.6	0	1.3	57.4	217.6	281.4
JEFF	8.7	22.8	0	12.2	31.6	232.1	307.4
LAWR	0	1.0	0	0	17.7	71.5	90.2
MERC	0	0.8	0	0.2	53.2	105.4	159.6
SOME	26.1	17.2	0	8.5	110.0	275.3	437.1
VENA	0	15.3	0	22.7	32.6	284.5	355.1
WASH	0	2.1	0	0.2	44.3	173.5	220.1
WEST	3.4	9.5	0	0.4	43.1	252.6	309.0
19 County Total	195.8	214.4	223.9	165.6	709.7	3756.9	5266.3

St. For. = State Forests; Gm. Land = Game lands; Nat. For. = National Forest; For. In. = Forest Industry; T.C.F.A. = Total Commercial Forest Acreage.

1. 1964-1967

2. For. In. = 35% pulpmills, 37% sawmills and 28% wood-using industry (exclusive of logging) on a state-wide basis.

3. 1964 Census of Agriculture

SOURCE: Pa. Dept. of Commerce (21)

TABLE 2.1.4.-6

DEFINITIONS OF FOREST COVER TYPES

APPEARING IN TABLE 2.1.4.-7

White pine: Forests in which 50 percent or more of the stand is eastern white pine. In Pennsylvania, this includes a small acreage in the hemlock type.

Virginia-pitch pine: Forests in which 50 percent or more of the stand is Virginia pine, pitch pine or other yellow pines, singly or in combination. Includes small areas of the spruce forest type.

Oak-hickory: Forests in which 50 percent or more of the stand is upland oaks or hickory, singly or in combination except where pines comprise 20 to 49 percent, in which case the stand would be classified oak-pine. It also includes the yellow poplar - oak forest type.

Other oak types: Primarily oak-pine and oak-gum forests. Those forests in which 50 percent or more of the stand is hardwood, usually upland oak, but in which pines make up 25 to 49 percent of the stand are categorized as oak-pine. Oak-gum forests are bottomland types in which 50 percent or more of the stand is blackgum, sweetgum, or oaks, singly or in combination, except where pines comprise 25-49 percent.

Elm-ash-red maple: Forests in which 50 percent or more of the stand is American elm, black ash or red maple, singly or in combination. When all three species are present, this signifies a wet site. In Pennsylvania predominantly red maple stands on upland sites make up most of the acreage in this broad type.

Maple-beech-birch: Forest in which 50 percent or more of the stand is sugar maple, beech or yellow birch, singly or in combination. It includes the black cherry forest type.

Aspen-birch: Forests in which 50 percent or more of the stand is aspen, paper birch, gray birch, or pin cherry, singly or in combination.

TABLE 2.1.4.-7

ORBES - PENNSYLVANIA COMMERCIAL FOREST

COMPOSITON BY TREE ASSOCIATION[1]

County	T.C.F.A.[2] (thousand acres)	% White pine	% Pitch-Virginia Pine	% Oak-Hickory	% Other Oaks	% Elm-Ash Red Maple	% Maple Beech-Birch	% Aspen-Birch
Alle	172.5	4.4	0.8	26.7	2.4	22.2	16.6	26.9
Arms	210.0	4.9	0.7	29.7	2.0	24.6	18.1	20.0
Beav	126.3	4.7	0.6	27.9	1.9	23.0	19.5	22.5
Butl	252.7	4.8	0.7	28.7	1.9	24.1	19.7	20.1
Camb	278.3	2.1	1.0	55.7	5.1	9.7	21.8	4.6
Clar	266.7	8.4	4.5	52.5	1.8	6.6	9.6	1.6
Clea	585.9	6.8	2.3	59.4	1.3	8.8	12.3	9.2
Elk	471.6	4.9	---	20.8	0.8	12.1	47.7	13.7
Faye	316.7	2.5	1.5	55.3	5.7	9.1	20.1	5.7
Fore	251.6	4.9	---	19.1	3.0	11.4	50.0	11.6
Gree	185.0	4.6	0.9	27.1	2.6	22.3	19.7	22.7
Indi	281.4	4.9	0.8	29.6	2.2	24.2	18.5	19.7
Jeff	315.6	9.9	3.5	54.1	1.5	7.8	9.4	13.8
Lawr	90.2	4.5	0.6	27.7	1.7	23.3	18.7	23.5
Merc	159.6	4.2	0.9	24.9	2.8	20.7	18.1	28.4
Some	437.1	2.3	1.6	52.2	5.6	8.3	24.3	5.7
Vena	361.5	9.3	2.4	55.3	1.4	9.6	10.2	11.8
Wash	220.1	4.4	0.6	24.7	1.8	20.1	21.7	26.7
West	309.0	4.9	0.6	30.1	1.9	24.1	18.0	20.4
19 County TOTAL	5291.2	5.3	1.4	40.2	2.5	14.6	21.3	14.9

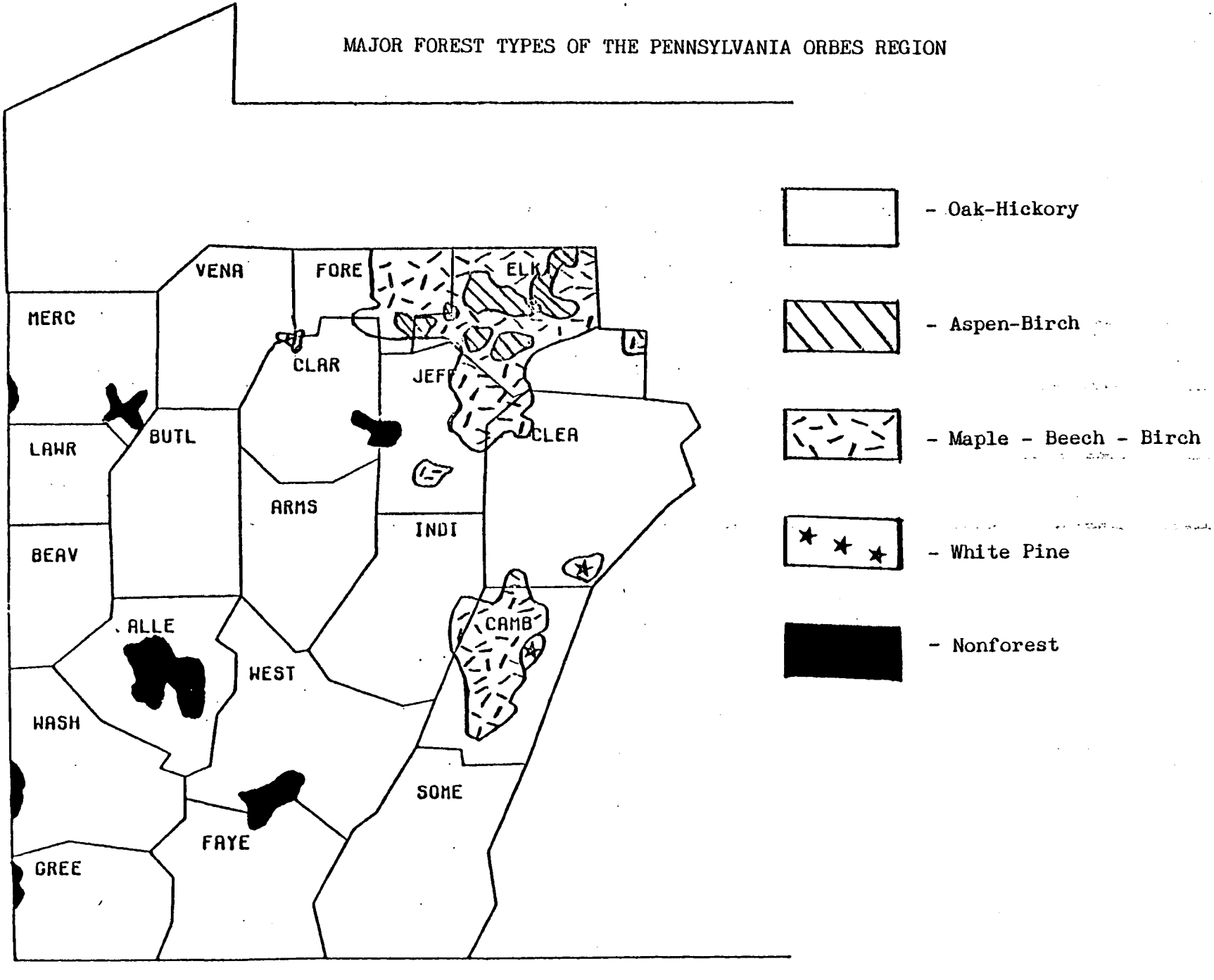
1. Percentage of county-specific, total commercial forest land (1965) occupied by the given tree association. Percentages may not add to one hundred due to rounding of figures.

2. T.C.F.A. Total Commercial Forest Acreage for 1965. Substantial increases in the amount of forested land within the Pennsylvania ORBES region have occurred during the past decade. For a more recent estimation of T.C.F.A. see Table 2.1.4.-4 (commercial forest lands typically comprise over 99% of the estimated forest acreage).

SOURCE: Adapted from Ferguson (25)

FIGURE 2.1.4. - 5

MAJOR FOREST TYPES OF THE PENNSYLVANIA ORBES REGION



SOURCE: Adapted from U.S. Forest Service (35)

TABLE 2.1.4.-8

ENDANGERED AND THREATENED PLANT SPECIES
IN THE STATE OF PENNSYLVANIA

Status	Specific Name	Common Name	Habitat Preference
Endangered	Cerastium arvense var. villosissimum	Long-hairy field Chickweed	Serpentine barrens
Endangered	Isotria medeoloides	Small whorled Pogonia	Acid soil in dry woods
Endangered	Potamogeton Porteri	Porter's pondweed	Shallow water
Endangered	Trollius laxus	Spreading globe-flower	Swamps, wet woods and wet meadows
Endangered*	Scirpus ancistrochaetus	Bulrush	Bogs
Threatened	Echinacea laevigata	Smooth purple coneflower	Woods and prairies
Threatened	Juncus gymnocarpus	Naked-fruited rush	Sphagnum bogs
Threatened	Cypripedium candidum	Small white lady's slipper	Calcareous sails of marly bogs, open swamps and wet prairies
Threatened	Platanthera peramoena	Purple fringeless orchid	Damp or wet soil
Threatened	Calamagrostis Porteri	Porter's reed-bentgrass	Wet rocks and sandy shores
Threatened	Muhlenbergia curtisetosa	Short-bristled Muhly grass	Moist, shady ground
Threatened	Poa paludigena	A meadow grass	Bogs and wet woods
Threatened	Asplenium ebenoides	Walking spleenwort	Woods banks and rocks in circumneutral soil
Threatened	Potamogeton Hillii	Hill's pondweed	Shallow water
Threatened	Prunus alleghaniensis	Sloe; Allegheny plum	Dry, rocky woods

(TABLE 2.1.4.-8 Cont.)

Status	Specific Name	Common Name	Habitat Preference
Threatened	*Micranthemum micranthemoides*	Lettuce-leaved saxifrage; Mountain lettuce	Muddy shores between estuary tide-marks

SOURCES: -Species after Smithsonian Institution (36).
-Habitat Preferences after Gleason and Cronquist (37).

*Revisions as of May 21, 1975; see Federal Register (38).

the Smithsonian Institution to prepare a list of endangered and threatened plant species. The term "endangered" denotes those species of plants in danger of extinction throughout all or a significant portion of their ranges. Plant taxa from very limited areas (e.g., type localities) or from restricted fragile habitats are usually considered endangered. Threatened species are those species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their ranges. This includes species categorized as rare, very rare, or depleted. Table 2.1.4.-8 presents a list of endangered and threatened plant species for the State of Pennsylvania with notations on the preferred habitat of these species.

The compilation of an endangered and threatened species list has gained new impetus in recent years and the potentiality exists for additions to the list in the near future. Table 2.1.4.-9 lists species which are rare in western Pennsylvania, have been found in Pennsylvania ORBES counties, but have not yet received official, threatened status. Likewise, Table 2.1.4.-10 lists species which are rare in western Pennsylvania, have been found in counties that neighbor the ORBES region, but have not yet been designated as threatened.

It is evident from these tables that the majority of endangered, threatened, or rare species are small, flowering plants native to moist or wet areas. Pine, serpentine, and shale barrens also support a significant number of such species.

I. Beneficial Aspects of Natural Vegetation

The precise monetary value of our botanic communities is unquantifiable, yet indisputably astronomical. Plants, either directly or indirectly, serve as the food source for virtually all heterotrophic organisms. Furthermore, the plants of fragile, ecosystems may serve as valuable indicator organisms, "sounding an alarm" to man in the event of environmental perturbations. Forests, woodlots, and fields serve as living and breeding places for our wildlife. Pennsylvanians have utilized particular species for timber and fiber for centuries. Modern man is equally dependent upon natural areas as aesthetically appealing places for seeking tranquility or pursuing outdoor-based recreation. In addition, well managed forests are extremely valuable entities within the framework of the hydrologic cycle. Such forests tend to control soil erosion and, therefore, promote good water quality.

The multiple benefits associated with our forests can be best insured by wise management and the preservation of species diversity within the various community types. The Smithsonian Institution (36) has rendered the following justification for this strategy.

TABLE 2.1.4.9

RARE PLANTS* OF THE PENNSYLVANIA 19 COUNTY ORBES REGION

Specific Name	Common Name	Location where found	Habitat Preference
Aconitum reclinatum grey	Trailing wolfs-bane	Wymp's Gap, Fayette Co.	Mountain woods
Aster lineariifolius L.	Linear-leaved Aster	Ohiopyle, Fayette Co.	Dry ground & open woods; esp. sandy soil
Carex fraseri Andr. (= Cymophyllus)	Fraser's Sedge	Reel's Corners, Somerset Co.	Rich mountain woods
Clethra acuminata Michx.	Mountain Sweet pepperbush	Elliotsville, Fayette Co.	Rich mountain woods
Croton glandulosus var. septentrionalis Mvell. Arg.	Glandular Croton	Bidwell, Fayette Co.	Dry or sandy soil
Eleocharis rostellata Torr.	Small-beaked spike-rush	Lawrence Co.	Saline or calcareous swamps and marshes; esp. along coast
Gentiana flavida Gray	Yellowish Gentian	Ribold to Renfrew, Butler Co.	Moist, open woods
Gentiana saponaria L.	Soapwort Gentian	Markleysburg Bog, Fayette Co.	Moist woods and thickets
Houstonia purpurea L.	Mountain Houstonia	Ohiopyle and Chalkhill, Fayette Co.	Dry woods , pine barrens and prairies
Iris prismatica Pursh	Slender Blue Flag	Ohiopyle floodplain, Fayette Co.	Sandy open woods & pine-lands
Magnolia tripetala L.	Umbrella Magnolia	Ohiopyle and Indian Creek, Fayette Co.	Rich woods
Marshallia grandiflora Beadle & F.E. Boynt	Barbara's - buttons	Ohiopyle, Fayette Co.	River banks and dry woods

(TABLE 2.1.4.-9 Cont.)

Specific Name	Common Name	Location where found	Habitat Preference
Polygala cruciata var. aquilonia Fern. & Schub.	Cross-leaved Milkwort var.	Chalkhill, Fayette Co.	Damp or wet soil; marshes and pine-barren:
Prenanthes racemosa Michx.	Great Lake Lion's-foot	Plaingrove Bog, Lawrence Co.	Stream banks, moist meadows
Samolus parviflorus Raf.	Water-pimpernel	Butler Co. (only 1 specimen collected)	Muddy stream banks & ditches
Stylosanthes riparia Kearney	Pencil-flower	Ohiopyle, Fayette Co.	Dry woods & barrens
Trillium cernuum var. macranthum Wieg	Nodding Trillium	Formerly grew @ Thornhill, Allegheny Co.	Moist or wet woods
Xyris torta J.E. Smith	Yellow-eyed Grass	Chalkhill Bog, Fayette Co.	Bogs & wet, esp. sandy soil

* These plants have been collected from only one Western Pennsylvania county.

Sources: -Species and their locations after Carnegie Museum Herbarium Records (39).

-Habitat preferences after Gleason and Cronquist (37).

TABLE 2.1.4.-10

RARE PLANTS* OF COUNTIES

NEAR THE PENNSYLVANIA ORBES REGION

Specific Name	Common Name	Location where found	Habitat Preference
Ammophila breviligulata Fern	Beachgrass	Presque Isle, Erie Co.	Dunes and dry sandy shores along all Great Lakes and Atlantic
Arctostaphylus glaucophylla var. latifolia Rehd.	Bog-rosemary	Sulfur Springs Bog, Warren Co.	Acid Bogs
Arctostaphylus uva-ursi var. adenotricha Fern. & Macbr.	Bearberry	Presque Isle, Erie Co.	Sandy or rocky soil
Botrychium multifidum (Gmel.) Rupr.	Leathery Grape-fern	Wattsburg, Erie Co.	Open, often moist and sanc places, rarely in woods
Butomus umbellatus L.	Flowering Rush	Escaped along Elk Creek and Presque Isle, Erie Co.	Shores and river banks alc St. Lawrence River Valley and some stations along Great Lakes
Cakile edentula var. lacustris Fern.	Scurvy-weed	Presque Isle, Erie Co.	Coastal sands
Chrysogonum virginianum L.	Chrysogonum	Warfordsburg, Fulton Co.	Woodland
Conioselinum chinense (L.)	Hemlock-parsley	Laurel Springs & Spruce Creek, Huntingdon Co.	Swamps, bogs, wet ledges and wet meadows
Diarrhena americana Beauv.	Twin grass	Bedford Co.	Moist woods
Eriocaulon septangulare Withering	Seven-angled pipewort	Canadohta Lake, Crawford Co.	Usually shallow water, occasionally in deep wate or on miry shores
Eriophorum spissum Fern.	Hare's-tail	Titus Bog, Erie Co.	Bogs and wet soil

(TABLE 2.1.4-10 Cont.)

Specific Name	Common Name	Location where found	Habitat Preference
Gerardia auriculata Michx.	Auricled Gerardia	Tonolowav Creek, Fulton Co.	Prairies or open upland woods
Habenaria leucophaea (Nutt.)	Prairie white-fringed orchid	Harmonsburg, Crawford Co.	Wet praries, bogs, marshes
Heteranthera reniformis R.&P.	Mud plantain	Lutzville, Bedford Co.	Submersed, floating or creeping in mud
Hibiscus palustris L.	Rose mallow	Presque Isle, Erie Co.	Salt marshes along coast
Iris verna var. smalliana Fern.	Upland violet Iris	Big Tonoloway Creek, Fulton Co.	Sandy soil, coastal barrens. piedmont, mountains.
Juncus alpinus var. rariflorus Hartm.	Alpine rush	Presque Isle, Erie Co.	Wet meadows and sandy or gravelly shores
Juncus balticus var. littoralis Engelm.	Baltic rush	Presque Isle, Erie Co.	Calcareous or brackish shores and dunes and also inland
Ledum groenlandicum Oeder	Labrador tea	Sulphur Springs Bog, Warren Co.	Bogs and wet shores
Ligusticum canadense (L.) Britt	Angelico	Breezewood, Bedford Co.	Woods, chiefly in the mountains
Listera australis Lindl	Southern Tway-blade	Sulphur Springs and Toplovich Bogs, Warren Co.	Shaded bogs and wet woods
Lonicera villosa var. tonsa Fern.	Mountain fly-honeysuckle	Toplovich Bog, Warren Co.	Swamps and wet woods
Pachistima Canbyi Gray	Canby's mountain-lover	Lutzville, Bedford Co.	Rocky woods in the mountains
Pinus echinata Miller	Short-leaved pine	Shale barrens in Fulton Co.	Dry, sandy, or rocky soil
Potentilla anserina L.	Silverweed	Presque Isle, Erie Co.	Wet, sandy beaches

(TABLE 2.1.4-10 Cont.)

Specific Name	Common Name	Location where found	Habitat Preference
Prenanthes serpentaria Pursh	Lion-foot	Bedford Springs, Bedford Co.	Woods
Pseudotaenidia montana Mackenzie	False pimpernel	Hewitt, Bedford Co.	Shale-barrens
Salix candida Flugge	Hoary willow	Presque Isle, Erie Co.	Cold bogs and glaciated areas
Salix glaucophylloides var. albovestita (Ball) Fern.	White-haired willow	Presque Isle, Erie Co.	Sandy shores, calcareous slopes and sometimes swam
Scheuchzeria palustris var. americana Fern.	Scheuchzeria	Titus Bog, Erie Co.	Cold sphagnum bogs
Senecio antennariifolius	Cat's-paw ragwort	Harrisonville, Fulton Co.	Shale-barrens
Shepherdia canadensis (L.) Nutt	Soapberry	Elk Creek and shores of Lake Erie, Erie Co.	Dry, sandy or stony, calcareous soil
Sida hermaphrodita (L.) Rusby	Virginia mallow	Saxton, Bedford Co.	Moist alluvial soil
Sparganium minimum Fries	Least Bur-reed	Presque Isle, Erie Co.	In shallow water
Spiraea corymbosa Raf.	Flat-topped Spiraea	Clearville, Fulton Co.	Mountain woods
Triglochin palustris L.	Marsh arrow-grass	Presque Isle, Erie Co.	Brackish marshes along t coast and in bogs
Utricularia resupinata B.D. Greene	Purple bladderwort	Presque Isle, Erie Co.	Muddy soil or very shall water at edge of ponds
Zizania aquatica var. angustifolia Hitchc.	Northern wild rice	Presque Isle, Erie Co.	Marshes, stream banks an shallow water

* These plants have been collected from only one Western Pennsylvania County.

Sources: -Species and their locations after Carnegie Museum Herbarium Records (39)

-Habitat Preferences after Gleason and Cronquist (37).

> A wide variety of plant species is essential to the maintenance of the environment in a livalbe condition in order to prevent wind and water erosion and to aid in developing fertile soil, in storing water, and in maintaining or providing subsurface water. A wide diversity of plant species and populations, therefore, is required to stock the many different habitats and ecosystems of the earth and is necessary to maintain ecological stability. Man's own monocultural system of agriculture has taught him much about the problems of ecological stability in the need for protection from diseases, insect pests, weeds, depletion of soil nutrients, and similar ecological problems. ... A large untapped potential of enormous value to man exists if he preserves the diversity of plant species. It has been estimated that 50,000 new alkaloids can be discovered in plants, including possible cancer cures. New plant medicinals and drugs are presently being discovered.

The mere presence of a dense forest canopy above a land mass serves to reduce the erosive force of rainfall. Furthermore, the thick mats of leaf litter and humus, so typical of Pennsylvania's deciduous forest floors, effectively absorb and retain significant quantities of precipitation. These processes reduce runoff and erosion; consequently, they regulate stream flow and limit siltation. Table 2.1.4. - 11 depicts the substantially reduced capacity of harvested forest lands for erosion control. Field studies have indicated that roads used to access logging sites are probably more responsible for this diminished erosion-control capacity than the actual removal of trees (41). However, managed forests in western Pennsylvania have been shown to be substantially less erodible than their unmanaged counterparts (see Table 2.1.4. -12). The "Copeland Report" (43) noted that the hydrology and water quality of most of western Pennsylvania is influenced to a major degree by the forests of the area

Forested lands enhance water quality in several additional ways. Canopy cover often shades cold water streams from direct solar radiation, thereby inhibiting temperature increases and algae blooms. The autumnal leaf-drop "powers" the bioenergetics of the aquatic communities inhabitating woodland streams. Furthermore, the biomass of our terrestrial vascular plants acts as a storage reservoir within the hydrologic cycle that is not easily polluted by man. Unfortunately, indiscriminate land clearing, heavy livestock grazing, and poor lumbering practices have left approximately one-third of western Pennsylvania in poor hydrologic condition. Essentially all (95%) of Pennsylvania's forested land has a high to medium potential for hydrologic improvement (44).

TABLE 2.1.4 - 11

REPRESENTATIVE EROSION RATES FOR VARIOUS LAND USES

Cover type	Soil Loss Tons/Acre/Year
Forest	0.0375
Grassland	0.375
Abandoned Surface Mines	3.75
Cropland	7.50
Harvested Forest	18.75
Active Surface Mines	75.00
Construction	75.00

Source: U.S. Environmental Protection Agency (40)

TABLE 2.1.4. - 12

1974 LAND USE AND CALCULATED* EROSION RATES IN WESTERN PENNSYLVANIA

		LAND USE (%)				SHEET AND RILL EROSION RATES (tons/acre/year)				
							Forest			
Pa. DER Sub-basin	Acreage[1] (millions of acres)	Cropland	Pasture	Forest	Other	Cropland	Managed	Unmanaged	Pasture & Other Land	Weighted Averag
#16 (Upper Allegheny River Basin in Pa.)	2.375	16	6	74	4	3.4	0.4	7.2	2.9	1.2
#17 (Middle Allegheny River Basin)	1.607	16	4	75	5	3.9	0.5	9.2	4.2	1.8
#18 (Lower Allegheny River Basin)	1.347	22	5	61	12	3.8	0.5	9.2	5.2	2.3
#19 (Monongahela River Basin in Pa.)	1.521	20	10	56	14	6.5	0.5	10.1	5.4	3.4
#20 (Upper Ohio-Beaver River Basin in Pa.)	1.564	28	12	46	14	3.8	0.4	7.8	5.4	2.9

*Calculated using the universal soil-loss equation (USLE)

1. Acreage of sub-basin after federal land, urban land, built-up areas, and large water areas are deducted from the total area of the sub-basin.

SOURCE: Adapted from Pennsylvania Department of Environmental Resources (42).

2.1.4.2 VERTEBRATE FAUNA

A.) Amphibians and Reptiles

The great diversity of Pennsylvania's "herpetofauna" has classically been attributed to the presence of the Appalachian Mountains and three large river basins; these physiographic features provide a variety of suitable habitats throughout the Commonwealth. On a statewide basis, Netting and Richmond (45) indicate that seventy-six different species* of reptiles and amphibians have been recorded over the years. More than two-thirds of this total have been observed within the confines of the Pennsylvania ORBES region (46, 47, 48).

Although the physiographic features of the Commonwealth do not function as exceptionally strong distributional barriers, Reinert and Dalby (49) have noted the following generalized zoogeographic patterns:

I. A southern element of the Nearctic herpetofauna has penetrated the southeastern portion of the state, inhabiting the lowland and coastal plain region.

II. Another southern element has penetrated part, or all, of the Appalachian mountain system but has not been successful on the more westerly Appalachian Plateaus (Pa. ORBES region).

III. A western element of the Nearctic herpetofauna, consisting of a smaller number of species has entered the Appalachian Plateaus (Pa. ORBES region) but has had little success in penetrating the Appalachian Mountains.

However, these distributional patterns are "givens" in any environmental analysis (i.e. they are "part and parcel" of the ecological framework imposed by nature and evolution). Currently, the most dramatic influences on reptile and amphibian distribution within the Pennsylvania ORBES region arise from the activities of man. The Army Corps of Engineers (33, 34) summarize the most important distributional trend as follows, "As might be expected, the number of species and suitable habitats increases with distance from Pittsburgh and its associated urbanization, industrialization, and environmental pollution."

None of Pennsylvania's herpetofauna are currently included on the "Federal Endangered Species List" (50). The bog turtle (*Clemmys muhlenbergi*) was formerly listed but has recently been dropped from the list.** However, the Pennsylvania Fish Commission issues its

*This total is comprised of 21 salamanders, 15 frogs and toads, 4 lizards, 14 turtles, and 22 snakes.

**New evidence suggests that this turtle may merely be behaviorally secretive and not actually endangered.

own "List of Endangered, Threatened, or Status Indeterminant Amphibians and Reptiles" (see Table 2.1.4. - 13) which includes the bog turtle and seventeen other species of herps. Authority for the protection of Pennsylvania herpetofauna rests primarily with the Fish Commission. The annually published "Summary of Fishing Regulations and Laws" (52) outlines the laws regulating the possession of particular species.

Inasmuch as no extensive inventory of Pennsylvania's herpetofauna has ever been undertaken, the quantification of any past impacts is tenous. The herpetological records indicate that several currently rare species (Blanding's turtle, midland smooth softshell turtle, and Kirtland's water snake) were probably never exceedingly common in western Pennsylvania (53). Nonetheless, impacts on other species have indeed occurred since the herpetological records once indicated a high diversity in Allegheny County (48) and such is obviously not the case today. Conversely, certain species of herps seem to be quite compatible with civilization. Species still relatively common in Allegheny County include: American toad (Bufo a. americanus), garter snake (Thamnophis s. sirtalis), black rat snake (Elaphe o. obsoleta), milk snake (Lamphropeltis t. triangulum), northern dusky salamander (Desmognathus f. fuscus), red-backed salamander (Plethodon c. cinereus), and eastern box turtle (Terrapene c. carolina) (54).

The following four species of herps merit special consideration by virtue of their present status within the Pennsylvania ORBES region.

1. Massasauga (Sistrurus catenatus)

In the Pennsylvania ORBES region the massasauga (a prairie rattlesnake) occurs chiefly in wet meadows, although it may also inhabit bogs, swamps, and even dry woodlands (32, 46, 47). The literature (55) suggests that this snake, at least during the last century, never was exceedingly common in the Pennsylvania ORBES region. Nonetheless, natural succession and habitat destruction by man via the damming and draining of wetlands have served to make this rare species even more scarce in recent years (56, 57). Persecution by people who dislike snakes, especially poisonous ones, has doubtlessly intensified the problem (57). Consequently, the massasauga is currently labeled an endangered species by the Pennsylvania Fish Commission (see Table 2.1.4.-13). Although records of their occurrence exist for four Pennsylvania ORBES counties, at the present time known massasauga populations are essentially confined to areas near Slippery Rock (see Appendix, Natural Area #35) and Bruin in Butler County, in addition to Five Points in Venango County (58). Individuals have also been reported from the Pymatuning area in Crawford.*

*Crawford County is not a Pennsylvania ORBES County but it is drained by the Upper Ohio River system.

TABLE 2.1.4. - 13

PENNSYLVANIA FISH COMMISSION
LIST OF ENDANGERED (1), THREATENED (2)
OR STATUS INDETERMINATE (3) AMPHIBIANS
AND REPTILES

Common Name	Scientific Name	Status
+Blanding's turtle	Emydoidea blandingii	1
*Eastern mud salamander	Pseudotriton m. montanus	1
*Eastern tiger salamander	Ambystoma t. tigrinum	1
*New Jersey chorus frog	Pseudacris triseriata kalmi	1
*Southern plain leopard frog	Rana sphenocephala	1
*Eastern mud turtle	Kinosternon s. subrubrum	1
*Red-bellied turtle	Chrysemys rubriventris	1
*Broad-headed skink	Eumeces laticeps	3
*Eastern kingsnake	Lampropeltis g. getulus	3
Coal skink	Eumeces anthracinus	3
Green salamander	Aneides aeneus	2
Bog turtle	Clemmys muhlenbergi	1
Midland smooth softshell	Trionyx m. muticus	1
Kirtland's water snake	Clonophis kirtlandi	3
Eastern hognose snake	Heterodon platyrhinos	3
Rough green snake	Opheodrys aestivalus	3
Timer rattlesnake	Crotalus horridus	3
Massasauga	Sistrurus catenatus	1

Status categories are defined as follows:

1. Endangered: Actively threatened with extinction in the state. Continued survival unlikely without special protective measures.

2. Threatened: Not under immediate threat of extinction in the state, but occurring in such small numbers and/or in such restricted habitat that it could quickly cease to be a part of the state fauna.

3. Indeterminate: Apparently threatned or uncommon to rare, but insufficient data currently available on which to base a reliable assessment of status.

+Collected in Crawford County which is not a PA ORBES County but is drained by the Ohio River System.

*Based upon the herpetological records of the past (45,48), such species are not deemed to be likely inhabitants of the PA ORBES region.

Source: Adapted from PA Fish Commission (51); Netting and Richmond (45); and the U.S. Army Corps of Engineers (48).

2. Timber Rattlesnake (*Crotalus horridus*)

The timber rattlesnake inhabits rocky areas with a southern exposure in the more sparsely settled, mountainous counties of the Pennsylvania ORBES region. Although upland areas seem to be its preferred habitat, the timber "rattler" is known to descend into valleys to obtain water in the late summer (45). In the past, specimens have been recorded from ten of the nineteen Pennsylvania ORBES counties (see Fig. 2.1.4.-6); however, at the present time, significant populations within this area are probably confined to the northern section (Elk, Forest, Venango, Clarion, and Jefferson Counties) (58, 59). Consequently, the timber rattlesnake is currently listed as an indeterminate species by the Pennsylvania Fish Commission (see Table 2.1.4.-13).

The greatest threat to the continued survival of the timber rattlesnake within the Commonwealth is direct persecution by man. Pursuit of these "rattlers" was at one time encouraged by a bounty of one dollar per snake and past references describe lone snake hunters slaughtering hundreds of them in the northcentral portion of the state (55). At the present time, outdoorsmen and farmers may still kill them because of a fear and/or hatred of snakes, especially poisonous ones. Organized snake hunts for sport also occur in Pennsylvania and although the "rattlers" are usually released unharmed, a recent committee on reptile conservation (60) has recommended the prohibition of such hunts.

Timber rattlesnakes are known to congregate in rocky den areas, which often harbor numerous individuals, especially during hibernation. For this reason, they are particularly susceptible to impact from earth-moving activities within their preferred habitat.

3. Bog Turtle (*Clemmys muhlenbergi*)

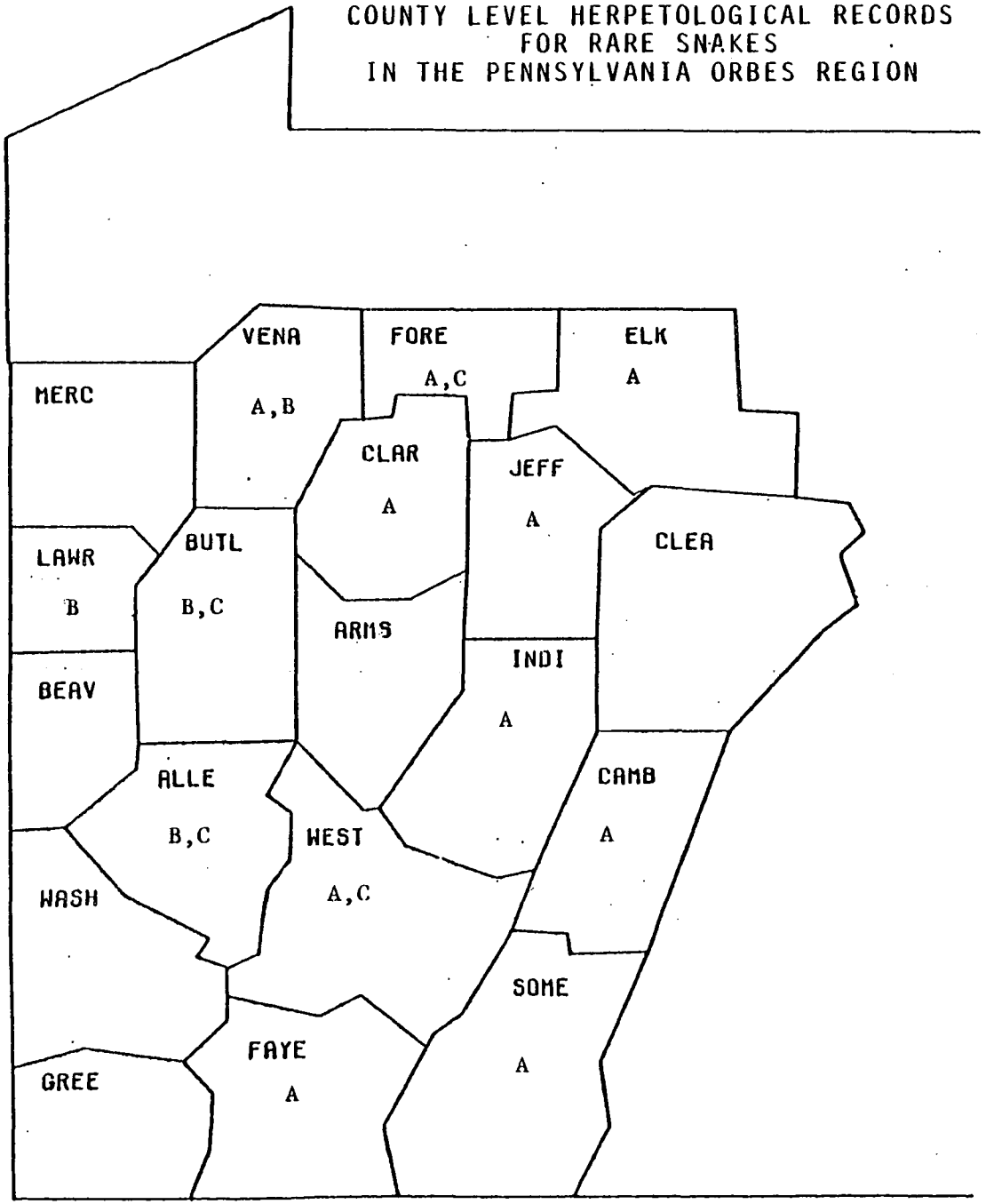
The bog turtle is a small, semi-aquatic turtle which is currently categorized by the Pennsylvania Fish Commission as an endangered species (see Table 2.1.4.-13). The ruination of this turtle's preferred habitat (bogs and marshes) is thought to be the principle cause for its demise (58, 61). In addition, the scarcity of this reptile makes it a valuable "black market" item among exotic pet fanciers and herpetologists.

The bog turtle is believed to be very rare in the Pennsylvania ORBES region. Moreover, this turtle's secretive nature complicates efforts to locate and identify populations for special protection. Specimens have been reported from Mercer County (48) and Conneaut Marsh in Crawford County* (32).

*Crawford County is not a Pennsylvania ORBES county but it is drained by the Upper Ohio River system.

FIGURE 2.1.4.-6

COUNTY LEVEL HERPETOLOGICAL RECORDS
FOR RARE SNAKES
IN THE PENNSYLVANIA ORBES REGION



LEGEND

A. Timber Rattlesnake

B. Massasauga

C. Kirtland's Water Snake

SOURCE: U.S. Army Corps of Engineers (48)

4. Hellbender (*Cryptobranchus alleganiensis alleganiensis*)

This large, fully aquatic salamander is more properly discussed within the realm of aquatic ecology; however, it will be dealt with herein since amphibians, as a group, are typically thought of as terrestrial creatures.

At one time hellbenders inhabited swift, cool, and clear streams with rocky bottoms throughout the Pennsylvania ORBES region. Excavations of Indian Villages and the herpetological records of Carnegie Museum indicate that they were relatively common in and around Allegheny County (58). At the present time, hellbenders are hardly rare in the Pennsylvania ORBES region; however, their distribution has been substantially reduced. The effects of siltation, acid mine drainage, river impoundment, and thermal pollution have almost eliminated them from much of southwestern Pennsylvania (33, 34, 58). The largest remaining populations inhabit the clean watersheds to the north and east of Pittsburgh, especially the Upper Allegheny River, French Creek, and Loyalhanna Creek (58).

At a recent symposium on the status of nongame species within the Commonwealth (60), professional and amateur herpetologists discussed management strategies for the state's herpetofauna. The following recommendations summarize the essence of the outcome:

a.) Conservation of habitat-this would include, but not limit itself to, the acquisition of critical habitat and adjacent lands for endangered and threatened species.

b.) The undertaking of a statewide inventory of the herpetofauna.

c.) The prohibition of organized snake hunts.

d.) The establishment of bag and possession limits for all currently nonprotected species.

e.) Rewrite existing legislation in a more comprehensive manner in such a way as to give the Fish Commission more enforcement clout.

B. Avifauna

Trustworthy records of bird abundance and species composition are nonexistant for western Pennsylvania in pre-colonial and colonial times. Nonetheless, Todd (62) suspects that birds were more plentiful then and that forest species predominated. Indeed, the extensive forests of pre-settlement Pennsylvania could not have conceivably furnished suitable habitat to numerically significant populations of field species such as the bobolink, meadowlark, prairie horned lark, bobwhite, vesper sparrow, savannah sparrow, and grasshopper sparrow. These species undoubtedly entered the Pennsylvania ORBES

region from the Mississippi Valley only after the agriculture and lumber industries had cleared substantial tracts of the virgin forest (see Section 2.1.4.1.-C).

Many ornithologists believe that atmospheric temperature is the primary ecological factor controlling the zoogeographic distribution of birds. Consequently, the life-zone concept of Allen (62) and Merriam (64) has often been applied to the Nearctic avifauna. This system divides North America into seven transcontinental belts of distribution, each of which is characterized by an assemblage of species. Figure 2.1.4.-7 maps the three life-zones that cross the Pennsylvania ORBES region. Table 2.1.4.-14 functions as a legend to this map by listing representative assemblages for each zone.

The Carolinian avifauna is comprised of typically southern species. In Pennsylvania, resident species belonging to this assemblage are believed to have their northernmost range limited by the severity of winter temperatures at higher latitudes. Altitudinal influence on temperature has impeded the colonization of the Allegheny Mountains by this group. Nonetheless, Todd (62) believes that these birds are numerically increasing and extending their occupied territory northward.

The Canadian avifauna is comprised of northern birds; however, in Pennsylvania this group contains few strictly boreal species. Moreover, changing forest conditions have resulted in a recession of Canadian species with an accompanying intrusion of the Alleganian avifauna from the south.

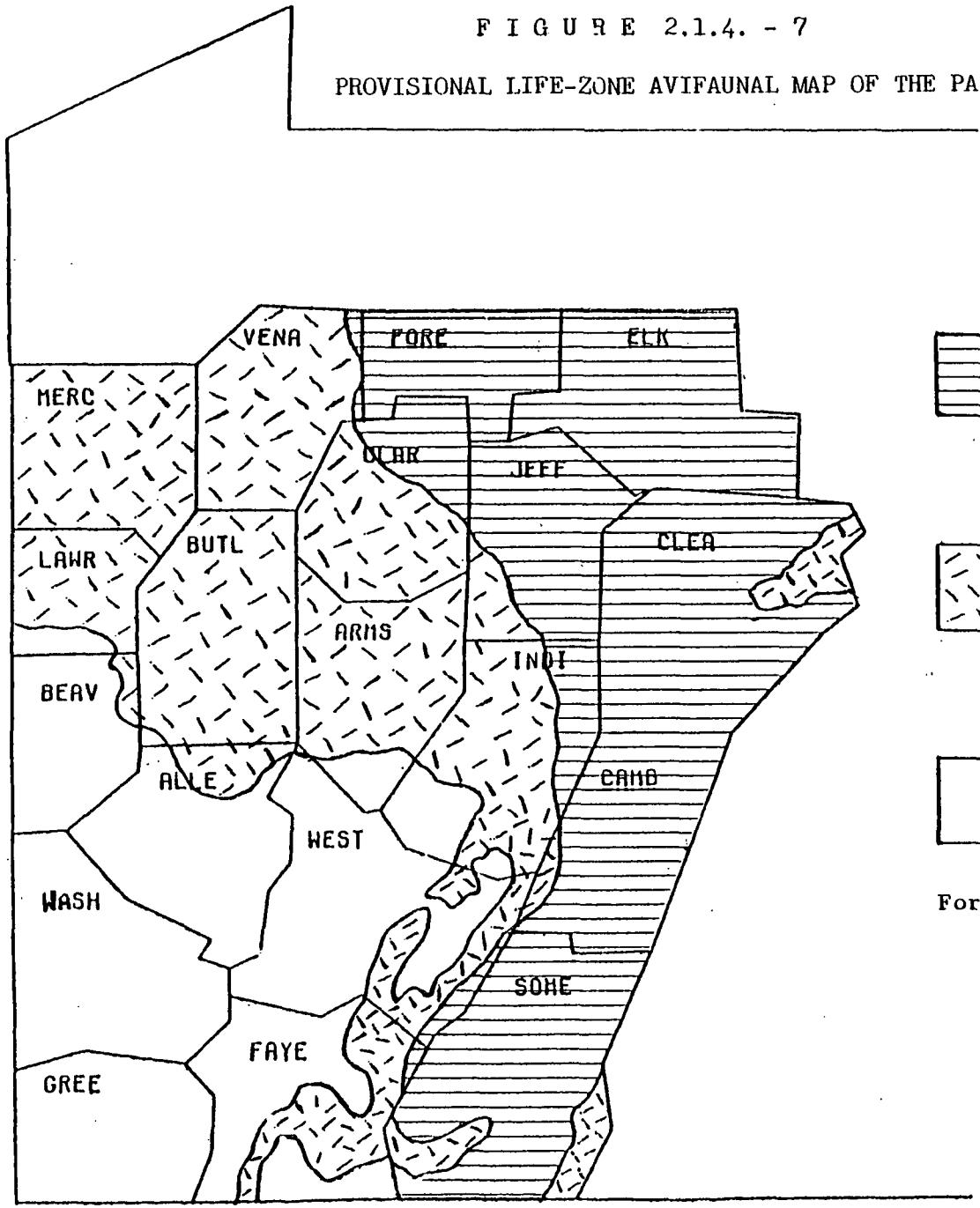
The Alleganian avifauna does not constitute a distinct zoogeographic unit in western Pennsylvania, since it lacks a unique assemblage of species. In the Pennsylvania ORBES region it may be regarded as a transition belt of varying width, an area of overlap where northern and southern avifaunal elements abut and intermingle (62).

The life-zone concept has been justifiably attacked by many ecologists over the years. Indeed, the zoogeography of many species cannot be adequately explained by this method. The concept has been presented herein merely to illustrate the current distributional trend of a receeding northern avifauna and an expanding southern avifauna. Todd (62) notes that although this trend is probably "characteristic of life flowing north in the backwash of the last glaciation," it has undoubtedly been accelerated and modified by man.

The draft material of the Army Corps of Engineers' "Environmental Resource Inventory" (48) indicates that 284 species of birds occur in western Pennsylvania (35). However, only 186 of these birds can be legitimately categorized as "relatively abundant."

FIGURE 2.1.4. - 7

PROVISIONAL LIFE-ZONE AVIFAUNAL MAP OF THE PA. ORBES REGION



LEGEND

-Canadian Avifauna

-Alleghanian Avifauna

-Carolinian Avifauna

For an explanation of the legend see Table 2.1.4. - 14.

SOURCE: Adapted from Todd (62)

TABLE 2.1.4. -14
KEY TO LEGEND OF PROVISIONAL LIFE-ZONE AVIFAUNA
MAP (Figure 2.1.4.-7)

Canadian Avifauna	Alleghanian Avifauna	Carolinian Avifauna
Eastern Goshawk	Yellow-bellied Sapsucker	Turkey Vulture
Yellow-bellied Flycatcher	Least Flycatcher	Barn Owl
Alder Flycather	Tree Swallow	Red-bellied Woodpecker
Olive-sided Flycatcher	Black-capped Chickadee	Acadian Flycatcher
Red-breasted Nuthatch	Veery	Carolina Chickadee
Brown Creeper	Nashville Warbler	Tufted Titmouse
Eastern Winter Wren	Black-throated Green Warbler	Bewick's Wren
Eastern Hermit Thrush	Chestnut-sided Warbler	Carolina Wren
Swainson's Thrush	Bobolink	Eastern Mockingbird
Eastern Golden-crowned Kinglet	Rose-breasted Crosbeak	Blue-gray Gnatcatcher
Solitary Vireo	Eastern Purple Finch	Prothonotary Warbler
Magnolia Warbler	Eastern Savannah Sparrow	Worm-Eating Warbler
Black-throated Blue Warbler	Swamp Sparrow	Cerulean Warbler
Blackburnian Warbler		Kentucky Warbler
Northern Water Thrush and		Louisiana Water-Thrush
Grinnell's Water Thrush		Yellow-breasted Chat
Mourning Warbler		Hooded Warbler
Canada Warbler		Eastern Cardinal
Northern Pine Siskin		Bachman's Sparrow
Red Crossbill		
Slate-colored Junco		
White-Throated Sparrow		

SOURCE: Todd (62)

Furthermore, the relative abundance of many species is a seasonal phenomenon due to annual migrations. The current status of five groups in the study area is as follows:

1. Waterfowl

The Pennsylvania ORBES region is located on a major waterfowl migration route which is part of the Atlantic flyway. Consequently, the rivers of the area occasionally serve as resting places for migrating species such as the ring-necked duck (*Aythya collaris*), greater scaup (*A. marila*), goldeneye (*Bucephala clangula*), bufflehead (*B. albeola*), mallard (*Anas p. platyrhynchos*), oldsquaw (*Clangula hyemalis*), and common merganser (*Mergus merganser*) (33, 34). Ducks which may remain in the area to breed include the mallard, wood duck (*Aix sponsa*), and black duck (*Anas rubripes*). Marsh and wading birds known to inhabit the area include the great blue heron (*Ardea herodias*), killdeer (*Charadrius vociferus*), belted kingfisher (*Megaceryle alcyon*), greater yellowlegs (*Tringa melanoleuca*), and lesser yellowlegs (*T. flavipes*).

The most significant wetlands for the production of waterfowl in western Pennsylvania are located in Crawford and Erie Counties to the north of the Pennsylvania ORBES region. Sites of particular importance within the Pennsylvania ORBES region include the Shenango Wildlife Management Area, State Game Lands #270, and the Great Blue Heron Rookery in Mercer County; Beaver Run Reservoir in Westmoreland County; and State Game Lands #95 in Butler County (32, 65, 66).

2. Songbirds

Songbirds comprise the largest group of terrestrial vertebrates in the Pennsylvania ORBES region. Strictly woodland species have generally experienced population decreases over the years due to the clearing of the virgin forests (62). Conversely, populations of species preferring second growth woodland and thickets, suburban backyards and gardens, and agricultural areas have tended to increase. Species such as the robin (*Turdus migratorius*), house wren (*Troglodytes aedon*), cardinal (*Cardinalis cardinalis*), starling* (*Sturnus vulgaris*), and house sparrow* (*Passer domesticus*) are currently thriving in such areas (33, 34, 67).

Past impacts on Pennsylvania's songbirds are attributable to numerous factors including:

a.) Habitat destruction (primarily deforestation).

b.) Intensified competition from introduced European species.

*These species were introduced from Europe.

c.) Predation by the house cat, crow, and red squirrel.

d.) Increases in populations of the cowbird.

e.) Illegal shootings.

f.) Miscellaneous deaths indirectly caused by man (i.e. pesticides, electrical transmission lines, large plate glass windows).

3. Gamebirds

Ring-necked pheasant (*Phasianus colchicus*), ruffed grouse (*Bonasa u. umbellus*), wild turkey (*Meleagris gallopavo silvestris*), and mourning dove (*Zenaida macroura carolinensis*) are the most sought after gamebirds in the Pennsylvania ORBES region; woodcock (*Philohela minor*), bobwhite quail (*Colinus c. virginianus*), and snipe (*Capella gallinago*) are also pursued by hunters, although not as intensely. Riparian bottomlands in the study area function as habitat for pheasant and doves. The wild turkey has suffered from encroaching civilization; consequently, these upland birds attain their maximum population densities in the sparsely settled, "big woods" counties such as Elk, Forest, Venango, and Clarion. Ruffed grouse prefer dense cover as their habitat; this species has benefited from small timber operations in Somerset, Fayette, Venango, and Clarion Counties (68, 69). Population data for the three most extensively studied gamebird species are presented in Tables 2.1.4. - 15, 16, and 17.

4. Predatory Birds

Approximately twenty-one species of predatory birds are known from western Pennsylvania (33, 34). Hawks and owls account for the greatest number of species, although eagles, falcons, and osprey are also known from the area. Most of the predatory birds inhabit woodlands, however many species frequently venture into fields while hunting. Red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperi*), great horned owl (*Bubo v. virginianus*), and screech owl (*Otus asio*) are some of the common predatory birds of the Pennsylvania ORBES region (33, 34, 60).

Although predatory birds have suffered from habitat destruction, significant impacts have also resulted from other miscellaneous factors. Adverse effects from the bioaccumulation of pesticides have received national attention. Predatory birds, including the bald eagle (61), have been known to die from electrocution on transmission lines. Substantial impacts in the Pennsylvania ORBES region have resulted from formerly existing predator control programs. The campaign instituted against the goshawk (a predator of game animals and domestic fowl) in 1929 best exemplifies such impacts. During the first year of this statewide

TABLE 2.1.4.-15

RING-NECKED PHEASANT POPULATION
DATA* FOR PENNSYLVANIA ORBES COUNTIES

County	Range Type	Thousands Acres Habitat[1]	Avg. Annual Peak Population Density[2]	Avg. Fall Population Density[3]	Avg. Annual Harvest[4]	Harvest Value[5]
ALLE	1st Class	13.1	533	355	142	3.02
	2nd Class	331.5	272	181	54	1.15
	3rd Class	28.2	177	118	29	0.62
ARMS	1st Class	2.6	302	201	80	1.70
	2nd Class	9.8	143	96	29	0.62
	3rd Class	339.8	116	77	9	0.40
BEAV	2nd Class	190.5	197	131	39	0.83
	3rd Class	15.7	151	100	25	0.53
BUTL	2nd Class	359.9	254	169	51	1.09
	3rd Class	103.3	186	125	31	0.66
CAMB	2nd Class	39.3	314	209	63	1.34
	3rd Class	98.3	236	157	39	0.83
CLAR	2nd Class	38.9	399	266	80	1.70
	3rd Class	78.9	215**	144**	50**	1.06**
CLEA	2nd Class	10.5	115	77	23	0.49
	3rd Class	155.3	84	56	14	0.30
ELK	3rd Class	68.3	75**	50**	18**	0.38**
FAYE	1st Class	64.2	646	431	172	3.66
	2nd Class	87.8	327	218	65	1.38
	3rd Class	107.0	251	167	42	0.89
FORE	3rd Class	13.3	Insufficient Data for Population Calculations			
GREE	2nd Class	61.6	148	99	30	0.64
	3rd Class	286.0	109	73	18	0.38
INDI	2nd Class	9.8	224	149	45	0.95
	3rd Class	313.8	160	106	27	0.57
JEFF	3rd Class	121.6	191	128	32	0.68
LAWR	2nd Class	215.4	352	235	71	1.51
	3rd Class	19.4	247	165	41	0.87
MERC	2nd Class	136.6	195**	130**	46**	0.98**
	3rd Class	256.5	122**	81**	28**	0.60**
SOME	2nd Class	20.3	289	192	58	1.23
	3rd Class	209.7	206	137	34	0.72
VENA	2nd Class	18.9	137**	92**	32**	0.68**
	3rd Class	182.1	88**	58**	20**	0.43**
WASH	2nd Class	239.8	395	264	79	1.68
	3rd Class	254.9	298	199	50	1.06
WEST	1st Class	248.4	586	391	156	3.32
	2nd Class	281.8	307	205	62	1.32
	3rd Class	3.2	210	140	35	0.75

* 1972 - '73 averages; cocks only unless otherwise noted.

** Cocks and hens.

1. Thousands of acres
2. Pheasants/thousand acres
3. Pheasants/thousand acres (immediately prior to commencement of the hunting season).
4. Pheasants harvested/thousand acres (during the hunting season).
5. Dollars/acre (based soley on hunters' expenditures in 1975).

SOURCE: Palmer (70).

TABLE 2.1.4.-16

RUFFED GROUSE POPULATION
DATA* FOR PENNSYLVANIA
ORBES COUNTIES

County	Amount of Habitat[1]	Avg. Annual Peak Pop. Density[2]	Avg. Fall Population Density[3]	Avg. Annual Harvest[4]	Harvest Value[5]
ALLE	86.2	253	169	25	0.23
ARMS	218.9	564	376	56	0.51
BEAV	134.6	421	281	42	0.39
BUTL	261.6	399	266	40	0.37
CAMB	284.6	280	187	28	0.26
CLAR	272.6	233	155	23	0.21
CLEA	608.0	185	123	18	0.17
ELK	360.4	107	72	11	0.10
FAYE	317.3	121	80	12	0.11
FORE	138.1	171	114	17	0.16
GREE	147.8	534	356	53	0.49
INDI	289.4	434	289	26	0.24
JEFF	292.8	288	192	29	0.27
LAWR	92.7	185	124	19	0.17
MERC	147.6	356	237	36	0.33
SOME	443.4	264	176	26	0.24
VENA	352.7	240	160	24	0.22
WASH	192.7	335	223	33	0.30
WEST	312.1	279	186	28	0.26

* 1972-73 averages
1. Thousands of acres
2. Grouse/thousand acres
3. Grouse/thousand acres (immediately prior to commencement of the hunting season)
4. Grouse harvested/thousand acres (during the hunting season).
5. Dollars/acre (based soley on hunters' expenditures in 1975).

SOURCE: Palmer (70)

TABLE 2.1.4.-17

WILD TURKEY POPULATION DATA*
FOR SOME PENNSYLVANIA ORBES COUNTIES**

County	Amount of Habitat[1]	Avg. Annual Peak Pop. Density[2]	Avg. Fall Population Density[3]	Avg. Annual Harvest[4]	Harvest Value[5]
CAMB	102.4	34.5	24.6	4.9	0.49
CLAR	144.0	9.9	7.0	1.4	0.14
CLEA	601.6	15.0	10.7	2.1	0.21
ELK	505.6	22.2	15.9	3.2	0.32
FORE	262.4	24.2	17.3	3.5	0.35
JEFF	233.6	28.5	20.4	4.1	0.41
SOME	160.0	32.2	23.0	4.6	0.46
VENA	192.0	18.4	13.1	2.6	0.26

* 1972-73 averages
** Remaining Pa. ORBES Counties have insufficient data for population calculations.
1) Thousands of acres
2) Turkeys/thousand acres
3) Turkeys/thousand acres (immediately prior to commencement of the hunting season).
4) Turkeys harvested/thousand acres (during the hunting season).
5) Dollars/acre (based soley on hunters' expenditures in 1975).

SOURCE: Palmer (70)

program, seventy-five percent of the birds presented as goshawk for bounty were other species of predators including: sparrow hawk, screech owl, golden eagle, turkey vulture, red-tailed hawk, red-shouldered hawk, Cooper's hawk, osprey, and even peregrine falcon (71, 72). More importantly, the predator control programs of the past convinced a significant number of Pennsylvania nimrods that predatory birds threaten game populations. Consequently, many predatory birds are still "shot on sight" in violation of both state and federal laws.

5. Endangered Birds

The peregrine falcon (*Falco peregrinus*), Kirtland's warbler (*Dendroica kirtlandii*), and southern bald eagle (*Haliaeetus l. leucocephalus*) are endangered birds which may occur in the Pennsylvania ORBES region. The falcon and warbler are occasional migrants through the area; the eagle nests in Crawford County which borders the ORBES region.

The peregrine falcon prefers rough, wooded country as its habitat. Todd (62) notes that peregrines have a tendency to avoid flat cultivated areas. In Pennsylvania the breeding areas of this falcon were typically located on cliffs in the vicinity of water. Although this falcon has not been known to breed in Pennsylvania since 1952 (56), thirty-four rock ledges once served as nesting sites in the state (72).

The abundance of peregrines in pre-colonial times has been estimated at a mere five thousand birds for the entire continent (73). The species was therefore prone to impact from man and his activities since the time of European colonization. The exact reasons for the demise of the peregrine are not definitely known; however, pesticides are suspected of killing birds directly and rendering eggs infertile (61, 73).

The Kirtland's warbler is a small songbird that nests in the jack-pine forests of Michigan and winters in the Bahama Islands. While migrating in the spring and fall, this bird has been known to pass through the Pennsylvania ORBES region (33, 34, 62). Mayfield (74) has ascribed their demise to the northward recession of the jack-pine plant association and increased pressure from the brown-headed cowbird.

The southern bald eagle currently inhabits a few areas in Crawford County, Pennsylvania. Three nests located in the Black Jack and Sanctuary areas of Pymatuning State Park and in Conneaut Marsh near Geneva usually yield two eggs/nest/year; however, only one of these six eggs typically hatches (75). Pesticides are suspected of being a possible cause of this poor reproductive success.

At a recent symposium on the status of nongame species in Pennsylvania the following recommendations were made for the management of the Commonwealth's avifauna:

a.) Adoption of guidelines (76) concerning the minimum breeding area requirements of warblers and vireos. Such guidelines should be incorporated into strategems for the management of state parks and forests.

b.) Elimination of pesticide use in the control of the gypsy moth.

c.) Consolidation and extension of existing knowledge of Pennsylvania birdlife.

C. Mammals

Prior to European colonization, the vast forests of Pennsylvania supported a diverse mammalian fauna. Wolf (*Canis lupus*), cougar (*Felis concolor*), beaver (*Castor canadensis*), fisher (*Martes pennati*), marten (*M. americana*), Canadian lynx (*Lynx canadensis*), elk (*Cervus canadensis*), and even an occasional wolverine (*Gulo luscus*) were known to inhabit pre-settlement Pennsylvania (14, 77, 78). Some authors contend that moose (*Alces alces*) and bison (*Bison bison*) were also present, but such claims have never been substantiated (79, 80, 81). By the end of the nineteenth century, all of the aforementioned species had become extinct from the state (77). Moreover, market hunting had made white-tailed deer (*Odocoileus virginiana*) so rare, that occasional sitings merited front page coverage in certain area newspapers (81). Later efforts by the Pennsylvania Game Commission resulted in the re-introduction of the beaver and elk. Management techniques likewise helped to greatly increase the deer herd. Nonetheless, the majority of the original boreal species have remained extinct from the state.

The draft material of the Corps of Engineers', "Environmental Resource Inventory," (48) lists sixty-two species of mammals as currently occurring in western Pennsylvania. About half of these species can be legitimately categorized as common. During the last century, populations of the white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinensis*), woodchuck (*Marmota monax*), red fox (*Vulpes vulpes*), meadow vole (*Microtus pennsylvanicus*), and raccoon (*Procyon lotor*) have faired well and in many instances have shown evidence of increasing. Conversely, bobcat (*Lynx rufus*) and river otter (*Lontra canadensis*) populations have suffered extensive damage in the Pennsylvania ORBES region.

Current patterns of mammalian distribution within the study area vary from species to species. Many mammals such as the chipmunk, gray squirrel, and raccoon are abundant throughout the Pennsylvania ORBES region. Nonetheless, several general trends are evident:

a.) Deer and black bear (Ursus americanus) population densities are greatest in the northeastern counties of the study area.

b.) Porcupine (Erethizon dorsatum) and beaver populations are essentially confined to the northern counties.

c.) Fox squirrel (Sciurus niger rufiventer) populations are essentially confined to the counties around Pittsburgh.

d.) Cottontail rabbit, woodchuck, and vole, population densities are greatest in the semi-agricultural counties around Allegheny County.

e.) The Norway rat (Rattus norvegicus), an introduced pest, reaches peak densities on riparian land around urban areas.

The Pennsylvania Game Commission classifies deer, elk*, black bear, wild rabbits, woodchuck, raccoon, squirrels, bobcat*, and snowshoe hare as game mammals. Population data on the three most extensively studied species is presented in Tables 2.1.4.-18, 19, and 20. Mink, muskrat, foxes, river otter*, beaver, skunk, and opossum are classified as furbearers. Hunting and trapping constitute big business in the Commonwealth of Pennsylvania; license sales alone typically exceed 14 million dollars annually. Millions more are spent each year on ammunition, firearms, and supplies. In the 1976-77 marketing year, the statewide fur harvest (673,747 pelts, comprised chiefly of muskrat) was worth 6.12 million dollars.

Past impacts on Pennsylvania's mammalian fauna are partially attributable to deforestation via excessive logging, market hunting, intensive fur trapping, and predator control programs. These activities no longer represent ecological threats to the Pennsylvania ORBES region; they have long since been either discontinued or placed under strict regulations. Urbanization and industrialization are currently the greatest source of detrimental impacts on wildlife. Increased noise levels, habitat destruction from construction activities, predation by free-roaming pets, gross pollution, and highway traffic accidents are among the more obvious causative agents.

Indeed, millions of mammals are killed every year on Pennsylvania's roads. Rabbit, raccoon, woodchuck, opossum, skunk, and deer are the most susceptible species. Quantifications of current annual small game road kills are not available; however, it is widely believed that such mortalities exceed the annual hunting harvest by a considerable amount. Big game road kills are less than hunting mortalities; however, they do account for a significant fraction of the total annual attrition in deer. Those road-killed deer which are located by Game Commission personnel are recorded. Doubtlessly, many crippled individuals amble off the highway and die without being reported or located. Thusly, the

*Hunting or trapping of these species is currently prohibited.

TABLE 2.1.4.-18

GRAY SQUIRREL POPULATION
DATA FOR PENNSYLVANIA ORBES COUNTIES

County	Amount of Habitat[1]	Avg. Annual Peak Population Density[2]	Avg. Fall Population Density[3]	Avg. Annual Harvest[4]	Harvest Value[5]
ALLE	86.2	4.4	2.9	0.29	2.13
ARMS	218.9	1.8	1.2	0.12	0.88
BEAV	134.6	2.2	1.5	0.15	1.09
BUTL	261.6	2.2	1.4	0.14	1.05
CAMB	284.6	1.4	0.9	0.09	0.68
CLAR	272.6	1.4	0.9	0.09	0.68
CLEA	608.0	1.0	0.7	0.07	0.48
ELK	360.4	0.5	0.3	0.03	0.23
FAYE	317.3	1.2	0.8	0.08	0.60
FORE	138.1	2.3	1.5	0.15	1.09
GREE	147.8	3.3	2.2	0.22	1.60
INDI	289.4	2.1	1.4	0.14	1.01
JEFF	292.8	1.7	1.2	0.12	0.84
LAWR	92.7	2.0	1.3	0.13	0.97
MERC	147.6	2.3	1.5	0.15	1.12
SOME	443.4	1.6	1.1	0.11	0.79
VENA	352.7	1.1	0.7	0.08	0.54
WASH	192.7	2.9	1.9	0.20	1.42
WEST	312.1	2.6	1.7	0.17	1.26

1. Thousands of acres
2. Squirrels/acre
3. Squirrels/acre (immediately prior to commencement of the hunting season).
4. Squirrels harvested/acre (during the hunting season).
5. Dollars/acre (based solely on hunters' expenditures).

SOURCE: Palmer (70).

TABLE 2.1.4-19

COTTONTAIL RABBIT POPULATION
DATA FOR PENNSYLVANIA ORBES COUNTIES

County	Amount of Habitat[1]	Avg. Annual Peak Population Density[2]	Avg. Fall Population Density[3]	Avg. Annual Harvest[4]	Harvest Value[5]
ALLE	194.8	6.8	1.6	0.47	11.52
ARMS	277.2	5.8	1.3	0.20	4.91
BEAV	169.1	6.8	1.5	0.31	7.62
BUTL	333.2	6.7	1.5	0.30	7.48
CAMB	226.6	4.9	1.1	0.23	5.55
CLAR	164.7	6.1	1.4	0.28	6.81
CLEA	184.1	6.8	1.5	0.31	7.62
ELK	135.0	4.0	0.9	0.14	3.33
FAYE	266.9	5.1	1.1	0.23	5.67
FORE	76.0	1.6	0.4	0.06	1.36
GREE	289.2	4.5	1.0	0.10	2.52
INDI	323.1	5.6	1.3	0.19	4.69
JEFF	184.0	6.8	1.5	0.31	7.62
LAWR	177.5	5.4	1.2	0.24	5.99
MERC	330.1	5.2	1.2	0.18	4.42
SOME	371.4	5.3	1.2	0.18	4.44
VENA	122.9	5.5	1.3	0.31	7.75
WASH	428.8	5.4	1.2	0.25	6.07
WEST	426.8	6.0	1.4	0.34	8.36

1. Thousands of acres.
2. Rabbits/acre.
3. Rabbits/acre (immediately prior to commencement of the hunting season).
4. Rabbits harvested/acre (during the hunting season).
5. Dollars/acre (based solely on hunters' expenditures in 1975)

SOURCE: Palmer (70).

TABLE 2.1.4.-20

WHITE-TAILED DEER POPULATION
DATA* FOR PENNSYLVANIA ORBES COUNTIES

County	Amount of Habitat[1]	Avg. Annual Peak Population Density[2]	Avg. Fall Population Density[3]	Avg. Annual Harvest[4]	Harvest Value[5]
ALLE	210.3	14.7	11.8	1.8	1.75
ARMS	391.0	30.5	24.4	4.9	4.85
BEAV	232.4	7.8	6.2	1.9	1.86
BUTL	466.6	19.2	15.4	3.8	3.83
CAMB	408.7	23.8	19.0	4.8	4.74
CLAR	358.2	46.4	37.1	7.4	7.37
CLEA	688.7	39.3	31.4	6.3	6.25
ELK	387.3	103.3	82.6	8.3	8.22
FAYE	463.7	8.7	7.0	1.7	1.74
FORE	147.8	193.4	154.7	23.2	23.10
GREE	348.3	27.9	22.3	3.4	3.34
INDI	482.2	30.5	24.4	6.1	6.07
JEFF	389.0	46.0	36.8	7.4	7.32
LAWR	213.6	7.8	6.2	0.9	0.93
MERC	380.3	10.0	8.0	2.0	1.98
SOME	655.1	15.0	12.0	4.2	4.18
VENA	412.1	56.1	44.9	8.8	8.93
WASH	496.2	9.1	7.3	1.8	1.81
WEST	576.6	20.3	16.3	4.1	4.04

*Based on 1972-75 averages

1. Thousands of acres.
2. Deer/thousand acres.
3. Deer/thousand acres (immediately prior to commencement of the hunting season).
4. Deer harvested/thousand acres (during the hunting season).
5. Dollars/acre (based solely on hunters' expenditures in 1975).

SOURCE: Palmer (70).

data presented in Table 2.1.4.-21 represents a conservative estimate of annual white-tailed mortalities due to traffic mishaps. Westmoreland, Butler and Venango Counties have among the highest mortalities in the Commonwealth. Fergus (83) notes that many deer and bear are killed along the portion of Interstate 80 that cuts through the heavily wooded Allegheny Plateau region (Clearfield, Jefferson, Clarion, and Venango Counties).

Approximately ten species of mammals are considered to be rare in the Pennsylvania ORBES region. By virtue of their present status, the following four species merit additional consideration.

1. River Otter (Lontra canadensis)

Prior to the twentieth century, this aquatic mustelid was a relatively common inhabitant of many Pennsylvania waterways. At the present time this species is very rare in the state and is probably extinct from the study area. The last individuals known to occur in the Pennsylvania ORBES region are as follows: the Ohio River in 1898, the Allegheny and Monongahela Rivers in 1899, Jacob's Creek in 1905, and Dunkard Creek in 1947 (79, 84). Otters were occasionally reported along wild sections of the Clarion River in the late 1940's, but Richmond and Rosland (85) were unable to verify any of these sitings.

The extirpation of otters from western Pennsylvania has been ascribed to excessive deforestation, water pollution, and intensive trapping (86). The current statewide population has been estimated to be between a range of 285-465 animals, ninety percent of which are confined to the northeastern counties of Pike, Monroe, and Wayne (87). Wildlife biologists with the Game Commission describe the otter as "barely holding its own" despite complete protection in 1952 (88). Nonetheless, Eveland and Ryman note that half of Pennsylvania's sixty-six counties contain suitable otter habitat. Moreover, a limited live-trapping and transferral program is now underway in an effort to repopulate the Commonwealth. The preservation of relatively large, clean streams with wild riparian land is necessary if this program is to be successful.

2. Elk (Cervus canadensis)

In pre-colonial and colonial times the Pennsylvania elk herds are believed to have attained their peak densities in the mountainous central portion of the state and in the Pocono region of the northeast; however, elk did indeed occur throughout much of the Pennsylvania ORBES region (79). The native Pennsylvania elk became extinct between 1860 and 1870. Stocking efforts commenced in 1913 with individuals procured from Yellowstone National Park; these animals were

TABLE 2.1.4.-21

AVERAGE ANNUAL[1] REPORTED
WHITE-TAILED DEER MORTALITIES
DUE TO TRAFFIC MISHAPS
IN THE PENNSYLVANIA ORBES REGION

County	Range	Mean	One Standard Deviation
ALLE	280 - 493	367	± 75
ARMS	267 - 666	505	± 132
BEAV	186 - 342	275	± 56
BUTL	637 - 1,133	807	± 176
CAMB	267 - 345	312	± 26
CLAR	504 - 745	593	± 86
CLEA	614 - 970	832	± 129
ELK	198 - 391	303	± 79
FAYE	118 - 300	206	± 59
FORE	401 - 592	469	± 85
GREE	173 - 392	259	± 74
INDI	502 - 695	596	± 81
JEFF	497 - 831	690	± 144
LAWR	80 - 119	102	± 16
MERC	304 - 417	342	± 40
SOME	325 - 456	392	± 49
VENA	652 - 1,041	845	± 140
WASH	209 - 493	312	± 89
WEST	907 - 1,260	1,089	± 136
TOT*	7,456 -10,167	9,307	± 936
STTO**	23,845 -29,914	26,177	±2,007

1. 1971-1977 data
* Total for the Pennsylvania ORBES region
** Total for the entire Commonwealth of Pennsylvania

SOURCE: Adapted from Pa. Game Commission (82).

released chiefly in the counties of central Pennsylvania. In the 1920's it became obvious that the elk population could not withstand hunting pressure, so the species was given complete protection in 1931.

Elk are currently very rare in Pennsylvania. The herd size has typically averaged about fifty or sixty individuals during the past decade (89). These animals are essentially confined to the Cameron-Elk-Forest County area. The majority of the population occurs between St. Mary's and Benezette in Elk County and on State Game Lands No. 14 in Cameron County (90, 91, 92). Preferred elk habitat consists of grassy openings and fringe areas where early post-disturbance successional communities merge with mature forest, providing both food and cover. The gradually maturing forests of State Game Lands No. 14 has eliminated many of these savanna-like areas, thereby pushing the elk to nearby agricultrual areas (93). The Game Commission has, therefore, undertaken a program of selected land clearing on SGL No. 14 in order to encourage the elk to remain on this tract.

The current estimated annual mortality rate for the herd is about fifteen percent. The deaths are due to brain worm infestation, natural attrition, shootings by careless deer hunters, shootings by farmers due to crop damage, and an occasional road kill (89). Moreover, it is believed that elk are "high strung" animals and that a lack of solitude may result in lower reproductive rates (79). This fact is especially alarming when one considers that elk aren't exceptionally prolific animals even under natural conditions.

3. Bobcat (Lynx rufus)

This nocturnal carnivore was relatively common throughout most of the state prior to the early 1930's. Because this cat preys upon game animals and livestock, the Commonwealth paid bounties on it from 1810 until the mid-1900's. During the twentieth century claims averaged about 200-300 cats per year with a range of 97-862 per year (79, 94). This predator control program is believed to have had a significant impact on the state's population (71, 95).

The present statewide population of bobcats is estimated from one hundred to six hundred individuals (96). The Game Commission believes that the population is currently on the upswing and although it is still very rare, it is not likely to become extinct (97). Prime bobcat habitat consists of extensive tracts of second growth woodland with brushy areas. In Pennsylvania they avoid areas with extensive farmland (92). Rocky recesses are typically chosen as den areas, therefore ledges, caves, and boulder piles may be considered

valuable habitat assets. The bobcat is susceptible to impact from man due to its wide-ranging nature; it is known that males may travel up to twenty miles in a single night in search of a mate. If any individuals currently occur within the Pennsylvania ORBES region, they are doubtlessly confined to sparsely populated areas in the northern and eastern counties (e.g. Elk, Forest, Clearfield, Cambria, and Somerset).

4. Indiana Bat (*Myotis sodalis*)

This is the only Pennsylvania mammal that is currently on the federal "Endangered Species List." Very little knowledge exists as to the bionomy and habits of this bat, for it was not described as a species until 1928 at which time it was already rare. In the Pennsylvania ORBES region, small wintering colonies have been reported from caves in Fayette and Westmoreland Counties. Future encounters with man could be severely detrimental to this species since hibernating cave populations are concentrated and, therefore, vulnerable to impact. (79).

At a recent symposium on the status of nongame species in Pennsylvania (60), the mammalogical committee made the following recommendations for the preservation of the Commonwealth's mammalian fauna:

a.) Undertake a state mammal field survey.

b.) Construct a detailed vegetation habitat map of the state.

c.) Make detailed studies of the transformations induced by major developments (highways, strip mines, etc.)

d.) Develop guidelines for minimizing destructive changes.

e.) Identify vulnerable species and habitats.

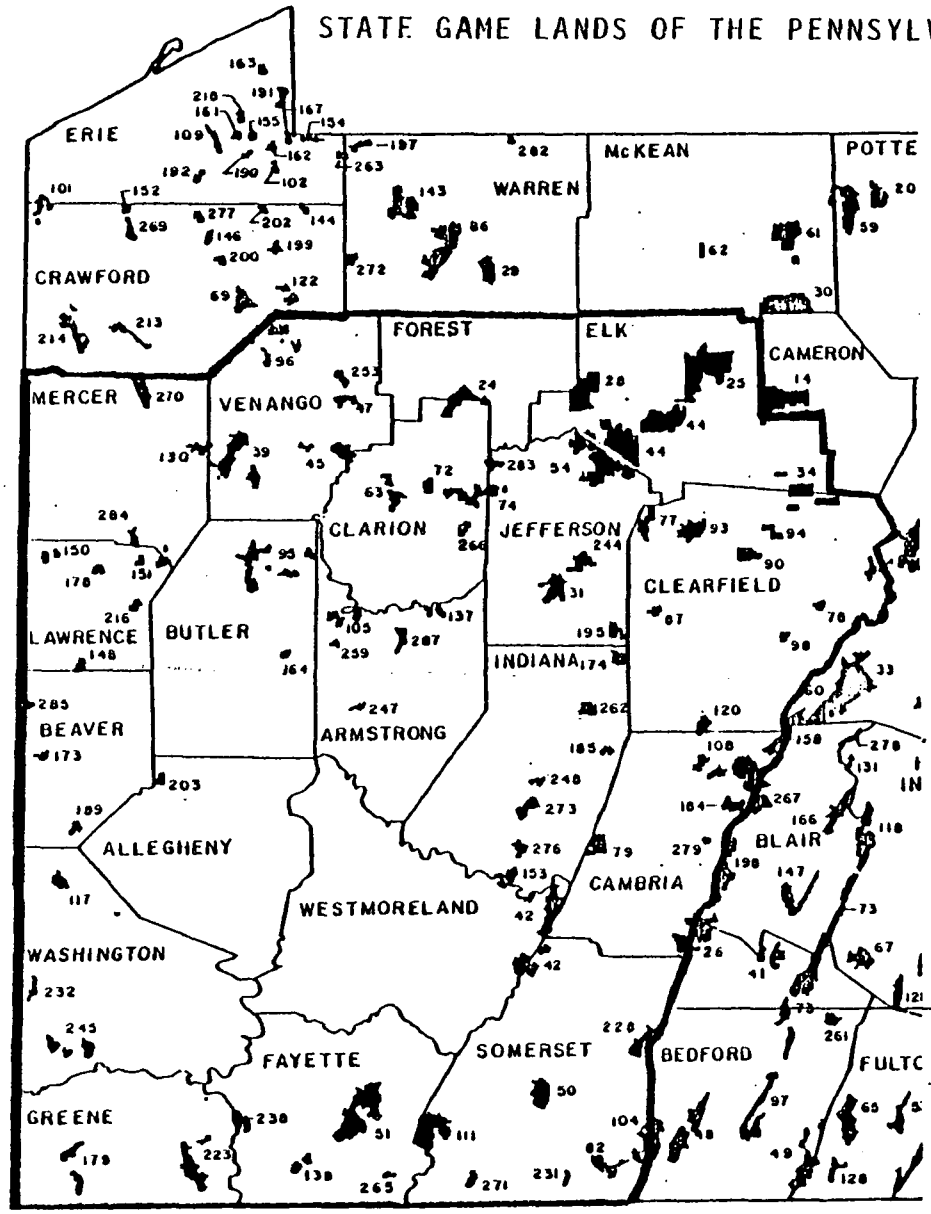
f.) Purchase remaining outstanding natural areas.

2.1.4.-3 SPECIFIC HABITATS

The Pennsylvania ORBES region contains a substantial number of wild, scenic, natural and/or recreational areas. The Allegheny National Forest comprises the largest single tract; the portion within the study area occupies over 224 thousand acres of Forest and Elk Counties. Throughout the study area, seventy-seven State Game Lands account for approximately 277 thousand acres (see Fig. 2.1.4.-8). Twenty-two existing State Parks and five State Parks currently under design, development, or acquisition contribute 119 thousand additional acres to the study area (see Fig. 2.1.4.-9)

FIGURE 2.1.4. - 8

STATE GAME LANDS OF THE PENNSYLVANIA ORBES REGION



Approx. Area of State Game Lands in the Study Region (thousands of acres)

ALLE	1.2
ARMS	4.8
BEAV	2.7
BUTL	8.6
CAMB	17.3
CLAR	11.0
CLEA	24.7
ELK	59.6
FAYE	19.7
FORE	7.8
GREE	9.2
INDI	8.1
JEFF	41.0
LAWR	2.1
MERC	4.4
SOME	17.2
VENA	21.0
WASH	7.4
WEST	9.5
TOT	277.3

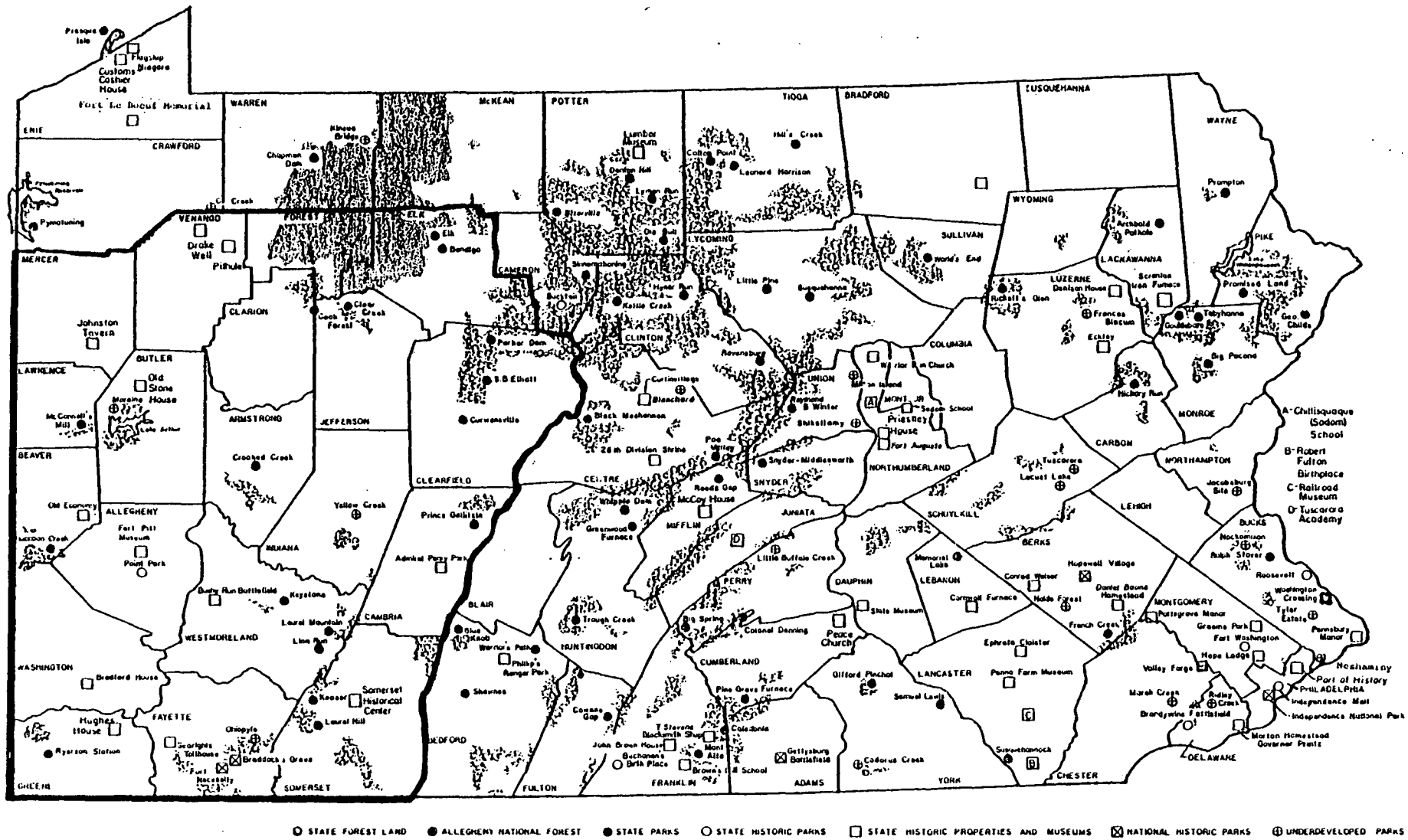
Boundary of the Pa. ORBES Region

SOURCE: Adapted from Pa. Game Commission (98).

FIGURE 2.1.4. - 9

STATE AND NATIONAL FORESTS/PARKS

OF THE PENNSYLVANIA ORBES REGION



SOURCE: Adapted from the Pa. Dept. of Commerce (99).

and Table 2.1.4.-22). Various picnic areas, historical sites and county parks account for several thousand more acres. For a more detailed mapping of these areas, the reader is referred to Plates IV-21 and IV-19 of Pennsylvania's, "Comprehensive Water Quality Management Plan." (COWAMP) for study areas 8 and 9 respectively (100, 101).

The Western Pennsylvania Conservancy has identified 159 "Natural Areas" in the Pennsylvania ORBES region (see Appendix A). These areas are by definition: a.) sites for basic scientific research, b.) environmental quality baseline study areas, c.) places providing guidance in land use, d.) habitats for reserves of breeding stock biota, e.) outdoor classrooms for ecology, and f.) protected areas of natural beauty (102). Many of these natural areas are located on State Game Lands, State Forests, or the Allegheny National Forest; others are located on privately owned land which may or may not be protected from degradation. Irregardless of ownership, these sites merit prime consideration in the assessment of any potentially adverse environmental impacts. The most significant of these natural areas are mapped on two plates (IV-22 and IV-17) of the Pennsylvania, "Comprehensive Water Quality Management Plan" for study areas 8 and 9 respectively (103, 104).

TABLE 2.1.4.-22

STATE AND NATIONAL PARK LAND
OF THE PENNSYLVANIA ORBES REGION

County	Name of Park	Acreage	Park Type[1]
ALLE	Allegheny Islands*	139	S
	Point State Park	36	H
ARMS	Crooked Creek	2,440	S
BEAV	Raccoon Creek	6,909	S
BUTL	Moraine	15,838	S
CAMB	Prince Gallitzin	6,249	S
CAMB-FAYE-SOME-WEST	Laurel Ridge	15,426	S
CLAR-FORE-JEFF	Cook Forest	6,418	S
CLEA	Curwensville	2,118	S
	Parker Dam	895	S
	S.B. Elliott	330	S
ELK	Bendigo	100	S
	Elk	3,192	S
FAYE	Fort Necessity	912	U
FAYE-SOME	Ohiopyle	18,443	S
GREE	Ryerson Station	1,104	S
INDI	Yellow Creek	2,822	S
JEFF	Clear Creek	1,209	S
LAWR	McConnell's Mills	2,512	S
MERC	Maurice K. Goddard	4,883	S
SOME	Babcock	54	P
	Kooser	170	S
	Laurel Hill	3,935	S
	Mount Davis	581	N
	Mount Davis	10	P
VENA	Allegheny River*	3,165	S
	Oil Creek*	7,001	S
WASH	Hillman*	3,780	S
WEST	Keystone	1,187	S
	Laurel Mountain	493	S
	Laurel Summit	15	P
	Linn Run	560	S
	Mountain Streams**	8,000	S
TOTAL		120,930	

*Under design or development
**Under acquisition

1. Key: S-State; P-State Forest Picnic Area; N-Natural Area; U-National; H-Historical

SOURCE: Pa. Bureau of Statistics, Research, and Planning (99).

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APPENDIX

APPENDIX

KEY TO ALPHA - NUMERIC DESCRIPTORS
OF NATURAL AREAS
IN THE PENNSYLVANIA ORBES REGION

FORMAT: Name of Site - County; 7.5' USGS Quad.; distance and direction from the nearest city; size in acres; owner; protection status.

Key type | Other types | K types See Table 2.1.4.-1

SAF = Forest types

OVT = Herbs, Scenic & Research types

Z = Zoologic types

G = Geologic types

A = Aquatic types

FOREST TYPES

SAF 16 Aspen

SAF 18 Paper Birch

SAF 19 Gray Birch - Red Maple

SAF 21 White Pine

SAF 22 White Pine - Hemlock

SAF 23 Hemlock

SAF 24 Hemlock - Yellow Birch

SAF 25 Sugar Maple - Beech - Yellow Birch

SAF 26 Sugar Maple - Basswood

SAF 27 Sugar Maple

SAF 28 Black Cherry - Sugar Maple

SAF 29 Black Cherry

SAF 39 Black Ash - American Elm - Red Maple

SAF 41 Scarlet Oak

SAF 43 Bear Oak

SAF 44 Chestnut Oak

SAF 45 Pitch Pine

SAF 46 Eastern Red Cedar

SAF 50 Black Locust

SAF 51 White Pine - Chestnut Oak

SAF 52 White Oak - Red Oak - Hickory

SAF 53 White Oak

SAF 54 Northern Red Oak - Basswood - White Ash

SAF 58 Yellow Poplar - Hemlock

SAF 59 Yellow Poplar - White Oak - Northern Red Oak

SAF 60 Beech - Sugar Maple

SAF 61 River Birch - Sycamore

SAF 63 Cottonwood

HERB, RESEARCH, AND SCENIC TYPES

OVT 3 Sand Barren

OVT 4 Prevernal Herbaceous Flora

OVT 5 Vernal Herbaceous Flora

OVT 6 Meadowlands

OVT 7 Scenic Areas/Natural Vistas

OVT 8 School Study Site/Research Site/ Nature Trail

OVT 9 Rare and Endangered Species Locality

OVT 10 Type locality

OVT 11 Talus Community

OVT 12 Cliff Community

OVT 13 Bryophytes and Ferns

OVT 15 Serotinal Herbaceous Flora

OVT 17 Heath Barren

OVT 19 Thickets

ZOOLOGIC TYPES

Z 9 Arthropoda

Z 13 True Fish

Z 15 Reptiles

Z 16 Birds

Z 17 Mammals

GEOLOGIC TYPES

G 1 Plains, Plateaus, and Mesas

G 6 Folded Mountains

G 9 Caves

G 10 Works of Erosion

G 11 Works of Glaciers

G 13 Volcanoes and Assorted Works

G 16 Igneous (granite, felsite, basalt)

G 17 Sedimentary (clay, sandstone, limestone)

G 23 Carbonates (calcite, aragonite)

G 28 Silicates (quartz, opal, talc, mica)

G 30 Non-human Zoologic

G 31 Botanic

AQUATIC TYPES

A 12 Rapidly Flowing Rivers and Streams

A 13 Slow Meandering Rivers and Streams

A 15 Springs

A 19 Large Shallow Lakes

A 22 Kettle Lakes and Potholes

A 23 Oxbow Lakes

A 25 Sphagnum Bog

A 29 Swamps and Marshy Areas

A 34 Lake Shorelines

APPENDIX

INVENTORY OF WESTERN PENNSYLVANIA CONSERVANCY NATURAL AREAS IN THE PENNSYLVANIA ORBES REGION

ALLEGHENY COUNTY

1. A.W. ROBERTSON ARBORETUM-Allegheny; Bridgeville; Pleasant Hills; 16 Ac; A.W. Robertson Corporation; complete protection.
   SAF52 (K104)

2. BOYCE PARK-Allegheny; Braddock; 2 miles N of Monroeville; 50 Ac; Allegheny County Parks; partial protection.
   SAF60 OVT9 (K102)

3. BURKE GLENN FOSSIL SITE-Allegheny; Murrysville; 2 miles W of Murrysville; PennDot; partial protection.
   G30 G17, G1

4. CROUSE RUN-Allegheny; Glenshaw; N of Allison Park; 55 Ac; private; no protection.
   SAF23 SAF61, OVT4, OVT9, OVT7 (K106)

5. DARK HOLLOW WOODS-Allegheny; New Kensington West; just N of Oakmont; 80 Ac; Oakmont Borough; complete protection.
   SAF52 G10 (K104)

6. DEER CREEK-Allegheny; New Kensington West; 2 miles E of Dorseyville; 70 Ac; private; no protection.
   SAF52 SAF23, SAF61, G10 (K104)

7. FALL RUN PARK-Allegheny; Glenshaw; 4 miles N of Etna; 109 Ac; Shaler Township; partial protection.
   OVT10 G10, OVT4, OVT7, SAF59 (K103)

8. 14 MILE ISLAND-Allegheny; New Kensington West; at Harmarville; 60 Ac; Western Pennsylvania Conservancy; complete protection.
   SAF61 SAF62, SAF63, G10, OVT8

9. HARMARVILLE ROAD CUT-Allegheny; New Kensington West; Harmarville; PennDot; no protection.
   G17 G30, G31

10. LAWRENCE ESTATE-Allegheny; Glenshaw; N of Etna; 200 Ac; Allegheny County Parks; partial protection.
    SAF52 (K104)

11. McCORMICK OAKS-Allegheny; Glenshaw; just NE of North Park Dam; 100 Ac; private; no protection.
    SAF52 (K104)

12. PENN HILLS PARK-Allegheny; New Kensington West; just N of Oakmont; 100 Ac; municipal park; no protection.
SAF27 G10, G1, OVT7 (K102)

13. RED CEDAR STAND-Allegheny; Glenshaw; S of Dorseyville; 10 Ac; private; no protection.
SAF46

14. TRILLIUM TRAIL-Allegheny; Glenshaw; NE of Sharpsburg; 100 Ac; Fox Chapel Borough; complete protection.
OVT4 SAF52, SAF59, A12 (K103, K104)

15. TURTLE CREEK-Allegheny & Westmoreland; Murrysville; N of Pitcairn; 300 Ac; private; no protection.
SAF61 G10

16. WHITE OAK PARK-Allegheny; McKeesport; just NE of White Oak; 50 Ac; Allegheny County Parks; partial protection.
SAF60 OVT4 (K102)

ARMSTRONG COUNTY

17. BRADY'S BEND OVERLOOK-Armstrong; East Brady; 2 miles N of East Brady; 2 Ac; PennDot; partial protection.
G10 OVT7

18. BUFFALO CREEK VALLEY-Armstrong & Butler; Freeport and Worthington; between Freeport and Worthington; private; no protection.
A12 SAF52, SAF23, SAF24, Z13, OVT7, OVT4, G10 (K104, K106)

19. CROOKED CREEK STATE PARK-Armstrong; Leechburg & Whitesburg; 2,480 Ac; State Park; partial protection.
SAF52 SAF59, G1 (K103, K104)

20. NICHOLSON ISLAND-Armstrong; Leechburg; just N of lock #6; 40 Ac; Western Pennsylvania Conservancy; complete protection.
SAF62 G10, A29

21. WORTHINGTON FOSSIL SITE-Armstrong; Worthington; 2.7 miles NW of Worthington; private; no protection.
G30 G17

BEAVER COUNTY

22. ALIQUIPPA FOSSIL SITE-Beaver; Aliquippa; 3 miles S of Aliquippa; private; no protection.
G30 G17, G1

23. BLAZING STAR MEADOW-Beaver; Beaver Falls; 1 mile NE of Beaver Falls; 7 Ac; private; no protection.
OVT9 OVT6, OVT15

24. LITTLE BEAVER RIVER-Beaver; East Palestine; N of Ohioville; private; no protection.
G11 OVT7

25. RACCOON CREEK STATE PARK-Beaver; Hookstown & Aliquippa & Burgettstown; 6,909 Ac; State Park: partial protection.
SAF52 SAF59, SAF16, SAF50, G1, A12 OVT6, OVT19 (K104, K103)

26. WILDFLOWER RESERVE-Beaver; Aliquippa & Clinton; NE of Raccoon Creek State Park; 300 Ac; Western Pennsylvania Conservancy; complete protection.
OVT4 SAF52, SAF62, SAF61, SAF39, SAF24, G1, A12, OVT19, OVT6 OVT8 (K104)

BUTLER COUNTY

27. ALLISON WOODS-Butler; Prospect; just N of Moraine State Park; 100 Ac; private; no protection.
OVT9 OVT5, OVT4, SAF25, SAF44, SAF52, SAF60 (K104, K102)

28. BEAR CREEK VALLEY-Butler; Foxburg; between Bruin and Parker; 500 Ac; State Game Lands; no protection.
SAF24 A12, G30, G17, G10, OVT5, OVT7, SAF52 (K104)

29. BURNS WOODS-Butler; Parker & Hilliards; 1 mile SW of Bruin; 10 Ac; private; no protection.
SAF52

— BUFFALO CREEK VALLEY-Armstrong & Butler; Freeport & Worthington; private; no protection. (see Nat. area #18)
A12 SAF52, SAF23, SAF24, Z13, OVT7, OVT4, G10 (K104, K106)

30. DESHON WOODS-Butler; Butler; 3 miles NW of Lyndora; 16 Ac; Butler Township; partial protection.
SAF52 (K104)

31. EPWORTH WOODS-Butler; Mars; 4 miles W of Mars; 30 Ac; private; no protection.
SAF52 (K104)

32. HEINER FOREST-Butler; Parker; just N of Bruin; 18 Ac; Western Pennsylvania Conservancy; complete protection.
OVT4 SAF52

33. HOGG WOODS-Butler; Slippery Rock; 2 miles NE of Slippery Rock; 30 Ac; private; no protection
SAF60 SAF53, G1, G11 (K104, K102)

34. JACKSON TOWNSHIP PARK-Butler; Zelienople; just N of Zelienople; 150 Ac; private; no protection.
OVT4 OVT9

35. JENNINGS NATURE RESERVE-Butler; Slippery Rock; 5 miles S of Slippery Rock; 300 Ac; Western Pennsylvania Conservancy; complete protection
OVT9 SAF16, SAF52, A29, A13, OVT6, OVT15, OVT19, OVT8, Z15 (K104)

36. LOWERY RUN-Butler; Emlenton; 1 mile SE of Emlenton; 90 Ac; private; no protection.
SAF23 A12, G10, OVT4 (K106)

37. McCORMICK GORGE-Butler; Slippery Rock; E of Moores Corners; 400 Ac; private; no protection.
G10 A12, G11, G1, SAF23, OVT4, A15, A23, SAF25, SAF59 (K103, K106)

38. MERIDIAN LABORATORIES-Butler; Butler; just NE of Meridian; 100 Ac; private; complete protection.
OVT8 Z16, SAF52, OVT6 (K104)

39. MILLER WOODS-Butler, Slippery Rock; 2 miles NW of Slippery Rock; 42 Ac; Slippery Rock State College; partial protection.
SAF27 SAF61, A23, G1, G11, A12 (K102)

40. MORAINE STATE PARK-Butler; Prospect and Chestnut and Slippery Rock; 15,921 Ac; State Park; partial protection.
G11 Z16, A19, A34, SAF16, SAF53, SAF52, SAF60, G1, OVT6, OVT19, (K104, K103)

41. ONEIDA DAM-Butler; East Butler; 4 miles NE of Butler; 200 Ac; water authority; partial protection.
Z16 OVT5

42. PARKER FOSSIL SITE-Butler, Parker; 1 mile SW of Parker; private; no protection.
G30 G17

43. RENFREW WOODS-Butler; Butler; W of Renfrew; 200 Ac; private; no protection.
OVT4 SAF59, SAF62, SAF52 (K103, K104)

44. ROUTE 488 OVERLOOK-Butler; Prospect; 2.2 miles N of the intersection of Rt. 488 and Rt. 422; 5 Ac; private; no protection.
G11

45. SCHOLAR'S RUN-Butler; Zelienople; 4 miles N of Zelienople; 80 Ac; private; no protection.
OVT9

46. SQUAW VALLEY RUN-Butler; Emlenton; SW of Emlenton; private; no protection.
SAF60 (K102)

47. TODD SANCTUARY-Butler, Freeport; 3.5 miles N of Freeport; 130 Ac; Audubon Society of Western Pennsylvania; complete protection.
SAF24 Z16, OVT7, OVT8, SAF52, SAF16, A12, G1, G10, OVT4 (K106, K104)

48. WEST LIBERTY ESKER-Butler; Slippery Rock; between West Liberty and Jackville; private; no protection.
G11

49. WOLF CREEK NARROWS-Butler; Slippery Rock; 2 miles NW of Slippery Rock; 100 Ac; private; no protection.
G10 SAF28, SAF59, SAF58, SAF60, G1, G11, A12, A29 (K106, K103)

CAMBRIA COUNTY

50. DUNLO FLATS-Cambria; Beaverdale; 2 miles SE of Dunlo; 200 Ac; private; no protection.
SAF19 SAF23, SAF16, G1, A25, A29 (K106)

51. ELMHURST BOG-Cambria; Ebensburg; 2 miles NE of Ebensburg; 10 Ac; private, no protection.
A25

52. LAUREL RIDGE STATE PARK-Cambria & Westmoreland & Somerset & Fayette; Johnstown & Rachelwood & Boswell & Ligonier & Bakersville, and Seven Springs & Kingwood & Mill Run & Ohiopyle; 15,436 Ac, State Park, 3,752 Ac. of which are in Cambria County; partial protection.
G6 OVT7, G10, A12, SAF44, SAF52, OVT19, OVT12 (K104)

53. PRINCE GALLITZIN STATE PARK-Cambria; Coalport; 6,600 Ac; State Park; partial protection.
SAF52 SAF25, SAF16, G1, A29 (K104, K106)

CLARION COUNTY

54. COOKS FOREST STATE PARK-Clarion & Jefferson & Forest; Cooksburg & Lucinda & Tylersburg & Marienville West; 7,822 Ac; partial protection. (Complete protection to 3 virgin tracts)
SAF21 SAF16, SAF22, SAF23, SAF24, SAF25, SAF52, G1, A12, A29 (K104, K106)

55. RIMERSBURG FOSSIL SITE-Clarion; Rimbersburg; 1.2 miles N of Rimbersburg; private; no protection.
G30 G17

CLEARFIELD COUNTY

56. BILGER ROCKS-Clearfield; Curwensville; 3.5 miles WNW of Curwensville; 30 Ac; private; no protection.
G10 G17, OVT7, SAF24, OVT12, OVT13 (K106)

57. CLEARFIELD FOSSIL REEF-Clearfield; Glenn Richey; 2 miles S of Clearfield; private; no protection.
G31 G17, OVT8, G1

58. NEW LONDON FOSSIL SITE-Clearfield; Ramey; 6 miles N of Beccaria; private; no protection.
G31 G17

59. QUEHANNA WILD AREA-Clearfield & Elk & Cameron; Driftwood & Sinnemahoning & Devils Elbow & Pottersdale; 50,000 Ac; Elk & Moshannon State Forests; partial protection.
SAF25 SAF16, SAF19, SAF44, SAF52, A29, G1, OVT6 (K104, K106)

ELK COUNTY

60. BIG HILL CREEK BOG-Elk; James City; Jones Township along Big Mill Creek S of a pipeline; 1 Ac; Allegheny National Forest; no protection.
A25 OVT9

61. BLACK CHERRY STAND-Elk; James City; 100 Ac; Kane Experimental Forest-Allegheny National Forest; partial protection.
SAF29 (K106)

62. BROCKPORT FOSSIL SITE-Elk; Brandy Camp; just N of Brockport; private; no protection.
G30 G17

63. DENTS FARM NATURAL AREA-(Proposed) Elk; West Creek; 2 miles N of Dents Run; 12+ Ac; Elk State Forest; complete protection.
SAF21 G1 (K104)

64. HIGHLAND BOG-Elk; James City; 1 mile N of Highland; 1 Ac; private; no protection.
A25

65. PAIGE RUN NATURAL AREA-(Proposed) Elk; Dents Run & Driftwood; 10 miles SW of Sinnamahoning; 917 Ac; Moshannon State Forest; complete protection.
SAF18 SAF16, SAF19, SAF52, G1, A29, OVT6 (K104)

— QUEHANNA WILD AREA-See Natural Area #59.

66. SPRING CREEK FOSSIL TRACKS-Elk; Hallton; NW of Hallton; 2 Ac; private; no protection.
G30 G17

FAYETTE COUNTY

67. ASKON HOLLOW-Fayette; Brownfield; SE of Fairchance; 300 Ac; private; no protection.
G9 OVT7, G10, G6, G17

68. BEAR RUN NATURE PRESERVE-Fayette; Mill Run; 2 miles S of Mill Run; 2,000 Ac; Western Pennsylvania Conservancy; complete protection.
OVT8 A12, G10, SAF52, SAF23, Z16 (K104)

69. CASPARIS CAVE-Fayette; South Connellsville; SE of Connellsville; private; no protection.
G9 G10, G6, G17

70. CONFLUENCE BOG-Fayette; Confluence; 3 miles W of Confluence; 10 Ac; private; no protection.
A25 G1

71. DEER LAKE MARSH-Fayette; Fort Necessity; 1.7 miles E of Chalkhill; 100 Ac; private; no protection.
A29 Z17

72. FALLINGWATER-Fayette; Mill Run; 3 miles N of Ohiopyle; 500 Ac; Western Pennsylvania Conservancy; complete protection.
SAF52 A12, G10, G6, G17, OVT7 (K104)

73. FOSSIL QUARRY: FAYETTE COUNTY-Fayette; Brownfield; 8 miles E of Uniontown; private; no protection.
G30 G17, G6

74. IGNEOUS INTRUSION-Fayette; Carmichaels; E of Adah on Middle Run; 3 Ac; State Game Lands #238; no protection.
G16 G13

75. INDIAN CREEK GORGE-Fayette; Mill Run; 4 miles NE of Mill Run; 700 Ac; private; no protection.
OVT7 A12, G10

— LAUREL RIDGE STATE PARK-See Natural Area #52 for descrip.; 2,841 Ac. of the 15,436 Ac. total are in Fayette County.

76. LICK RUN (LICK HOLLOW)-Fayette; Brownsfield; 7 miles E of Uniontown; State Forest; 1,000+ Ac; no protection.
SAF52 SAF59, G10, G6, A12, OVT7 (K104)

77. LINN RUN STATE PARK-Fayette; Ligonier; 560 Ac; State Park; partial protection.
SAF52 SAF25, SAF44, G1, G6, A12 (K104, K106)

78. MARKLEYSBURG BOG-Fayette; Ohiopyle; 6.1 miles E of Farmington; 10 Ac; private; no protection.
A25 OVT10, G1, SAF52

79. OHIOPYLE STATE PARK-Fayette & Somerset; Fort Necessity & Ohiopyle & Mill Run & South Connellsville; 18,483 Ac; State Park; partial protection (complete protection for the Ferncliff area).
SAF52 SAF59, G1, G10, G6, A12, OVT4, OVT6, OVT7, OVT19, OVT12, OVT13 (K103, K104)

80. QUEBEC WILD AREA (proposed)-Fayette; Smithfield & Brownfield; SE of Uniontown; 5,200 Ac; State Forest; partial protection.
SAF59 SAF52, SAF25, G10, G17, G9, A12 (K103, K104)

81. WHITE ROCKS-Fayette; Brownfield; 3.2 miles E of Fairchance; 100 Ac; private; no protection.
G10 G6, G17

FOREST COUNTY

82. BEAVER MEADOWS-Forest; Lynch; 1,000 Ac; Allegheny National Forest; no protection.
A29 G1

--- COOKS STATE FOREST-See Natural Area #54.

83. HICKORY CREEK WILDERNESS-(Proposed) Forest; Cobham; NE of Queen; 12,800 Ac; Allegheny National Forest; no protection.
SAF25 OVT7, A29, Z17, G1, G10, A12, SAF23, SAF24 (K106)

84. TIONESTA FOSSIL SITE-Forest; Tionesta; W of Tionesta; private; no protection.
G30 G17

GREENE COUNTY

85. CARMICHAELS FOSSIL SITE-Greene; Carmichaels; 4 miles N of Carmichaels; private; no protection.
G31 G17

86. ENLOW FORK OF WHEELING CREEK-Washington & Greene; Wind Ridge & Claysville; 4 miles S of Claysville; private; no protection.
OVT4 OVT9, SAF26, SAF61, SAF52, SAF53, OVT19, OVT6, SAF59 (K104, K103)

87. RYERSON STATION STATE PARK-Greene; Wind Ridge & New Freeport; 800 Ac; partial protection.
G28 G1, SAF52, SAF59 (K103, K104)

INDIANA COUNTY

88. CLARK RUN NATURAL AREA-(Proposed) Indiana; Vintondale; N side of Conemaugh River; 3 miles W of Johnstown; 384 Ac; Forbes State Forest; complete protection.
SAF59 G6, G10, OVT12, OVT8, A12 (K103)

89. PINK LADIES SLIPPER WOODS-Indiana; Burnside; 3 miles N of Glenn Campbell; 3 Ac; private; no protection.
OVT5 SAF21

90. SUN CLIFF-Indiana; Brush Valley; 12 miles SE of Indiana; private; no protection.
SAF24

91. WURTZITE LOCALITY-Indiana; Elderton; just W of Shelocta; PennDot; partial protection.
G23 G17, G30, OVT10

JEFFERSON COUNTY

92. CLEAR CREEK STATE PARK-Jefferson; Sigel; 1,123 Ac; partial protection.
SAF52 SAF51, G1, A12 (K104)

— COOKS FOREST STATE PARK-See Natural Area #54.

93. SUGAR HILL SCHOOL FOSSIL SITE-Jefferson; Carman; 3 miles W of Brockway; private; no protection.
G30 G17

LAWRENCE COUNTY

94. BLUE IRIS AREA-Lawrence; Harlansburg; 1.9 miles N of Harlansburg; 10 Ac; private; no protection.
OVT9 A29

95. BUCHANAN RUN-Lawrence; Edinburg; N of Pulaski; 110 Ac; Western Pennsylvania Conservancy; complete protection.
SAF24 G10, A12, OVT7, G11, SAF62, SAF52 (K106)

96. FRINGED GENTIAN BOG-Lawrence; New Castle S; 3 miles E of New Castle; 1 Ac; Western Pennsylvania Conservancy; complete protection.
A25 G11, OVT9

97. GARDNER SWAMP-Lawrence; New Castle South; 2 miles SE of New Castle; 15 Ac; private; no protection.
A29

98. KENNEDY MILLS-Lawrence; Portersville & Harlansburg; N of McConnells Mill State Park; 500 Ac; private; no protection.
G10 G11, A12, SAF23, SAF24, SAF25, G1, OVT7, (K103, K106)

99. LOCKE WOODS-Lawrence; Harlansburg; 2 miles NW of Harlansburg; 30 Ac; private; no protection.
SAF52 SAF53, A29, G1, G11, OVT19 (K104)

100. McCONNELLS MILL STATE PARK-Lawrence; Portersville; 2,000 Ac; complete protection (gorge portion).
G10 A12, SAF23, SAF24, SAF25, SAF44, SAF52, SAF59, G11, OVT7, OVT13, OVT4, OVT5, OVT12, OVT8, OVT9 (K103, K104, K106)

101. MUDDY CREEK FALLS-Lawrence; Portersville; N of Rose Point; 20 Ac; private; no protection.
G10 G11, OVT7, G1, A12

102. NORTH LIBERTY-BRENT SWAMP-Lawrence; Harlansburg; between N. Liberty & Brent; 100 Ac; State Game Lands 151; no protection.

103. PLAINGROVE BOG-Lawrence; Harlansburg; just W of Plaingrove; 20 Ac; private; no protection.
A25 A29, G11

104. PLAINGROVE POTHOLE-Lawrence; Harlansburg; N of Plaingrove; 300 Ac; private; no protection.
G11 OVT9

105. QUAKERTOWN FALLS-Lawrence; Campbell; 1.2 miles E of the Ohio-Pennsylvania Line; 70 Ac; private; no protection.
OVT7 SAF54, SAF58, SAF50, G10, G17, A12, OVT13 (K103)

106. ROCK POINT-Lawrence; Beaver Falls; W of Ellwood City; 100 Ac; private; no protection.
OVT9 G10, OVT7, A12, G11, SAF59 (K103)

107. WAMPUM FOSSIL SITE-Lawrence; New Castle S; 0.7 miles S of Wampum; private; no protection.
G30 G17

MERCER COUNTY

108. BLACKTOWN SWAMP-Mercer; Mercer; 1.9 miles WNW of Grove City; 135 Ac; private; no protection.
A29

109. CRANBERRY SWAMP-Mercer; Hadley; S of Sunol; 150 Ac; private; no protection.
A29 G11, G1

110. FRENCH CREEK HEMLOCKS-Venango & Mercer; Utica; N of Utica; 200 Ac; private; no protection.
SAF24 SAF23, SAF25, SAF52, G11 (K104, K106)

111. FOWLER BOG-Mercer; New Lebanon; N of Carlton; 10 Ac; private; no protection.
A25 A29, G11, G1, OVT9

112. GREAT BLUE HERON ROOKERY-Mercer; Mercer & Grove City; 5.6 miles NW of Slippery Rock; 25 Ac; private; no protection.
Z16 A29

113. GROVE CITY FOSSIL SITE-Mercer; Grove City; 2.5 miles N of Grove City; private; no protection.
G30 G17

114. HALFMOON SWAMP-Mercer; Jackson Center; 4 miles N of Fairview; 50 Ac; private; no protection.
A29

115. MAURICE K. GODDARD STATE PARK-Mercer; Sandy Lake & Lebanon; NW of Hadley; 6,972 Ac; partial protection.
OVT8 (K104, K106)

116. McCLURE TRACT-Mercer; Hadley; 1 mile NE of Clark's Mill; 100 Ac; private; no protection.
SAF29 SAF28, G11 (K102)

117. MERCER BOG-Mercer; Greenfield; 2 miles SW of Mercer; 30 Ac; private; no protection.
A25 A22, A29, G1, G11, OVT9 (K94)

118. OTTER CREEK SWAMP-Mercer; Jackson Center; 5 miles W of Jackson Center; private; no protection.
A29 G11

119. PINE SWAMP-Mercer; Sandy Lake; 5 miles S of Sandy Lake; 200 Ac; Western Pennsylvania Conservancy; complete protection.
A29 SAF25, SAF39, SAF52, SAF53, G1, G11, A25, OVT9, OVT19 (K104, K106)

120. SCHOLLARDS RUN-Mercer; Mercer & Harlansburg; 1 mile E of Leesburg; State Game Lands; 1,000 Ac; partial protection.
A29

121. SHENANGO RESERVOIR-Mercer; Sharpsville & Freedonia; N of Sharon; 13,000 Ac; Corps of Engineers; no protection.
Z16 A29, A34, G1

122. SPRINGFIELD FALLS-Mercer; Mercer; 2 miles NE of Leesburg; 50 Ac; State Game Lands; partial protection.
SAF25 G1, G11, G10, A12, OVT7 (K106)

123. SWAMP ROOT-Mercer; Grove City; just SE of Swamproot; 100 Ac; private; no protection.
A29 G11

SOMERSET COUNTY

124. BEECHDALE HOLLOW-Somerset; Murdock & Meyersdale; 5 miles N of Meyersdale; 120 Ac; private; no protection.
SAF22 SAF24, SAF59, G1, A12 (K103, K104)

125. BIG SPRING-Somerset; Markleton; 5.7 miles NE of Listonburg; 5 Ac; private; no protection.
A15

126. KINGS BRIDGE PARK-Somerset; Kingwood; 1.6 miles W of New Lexington; 300+ Ac; private; no protection.
A29 OVT19, A13

127. LAUREL HILL STATE PARK-Somerset; Seven Springs & Rockwood & Kingwood & Bakersville; 4,169 Ac; State Park; partial protection.
SAF24 SAF25, SAF52, SAF44, SAF59, G1, A12 (K104, K103, K106)

— LAUREL RIDGE STATE PARK-See Natural Area #52 for description; 5,354 Ac. of the 15,436 Ac; total are in Somerset County.

128. MOUNT DAVIS NATURAL AREA-Somerset; Markleton; 8 miles W of Meyersdale; 585 Ac; Forbes State Forest; complete protection.
G6 G10, SAF41, SAF44, SAF45, SAF43, SAF52, OVT11, OVT7, OVT17 (K104)

129. MOUNT DAVIS QUARRY-Somerset; Markleton; 3/4 mile W of Mount Davis; private; no protection.

130. PACK SADDLE-Somerset; New Baltimore & Fairhope; 2.4 miles NW of Fairhope; 400 Ac; private; no protection.
OVT7 OVT3, SAF22, G10, G6, A12

131. ROARING RUN SWAMP-Somerset; Somerset; 2 miles NE of Jennerstown; 100 Ac; private; no protection.
A29 G1

132. ROCKWOOD RESERVOIR-Somerset; Rockwood; NW of Rockwood; 30 Ac; water company; no protection.
SAF23 (K104)

VENANGO COUNTY

133. ALLEGHENY RIVER STATE PARK-Venango; Kennerdale & Polk; 3,140 Ac; State Park; partial protection.
SAF25 SAF52, A12, G1, G10 (K104, K106)

— FRENCH CREEK HEMLOCKS-See Natural Area #110.

134. HEMLOCK WOODS KENNERDALE-Venango; Kennerdale; junction of Scrubgrass and Bullion Creeks; private; no protection.
SAF23 G11 (K106)

135. OIL CREEK STATE PARK-Venango; Titusville South & Oil City & Pleasantville; 7,197 Ac; partial protection.
SAF52 SAF24, SAF25, A12, G1, G10 (K104, K106)

136. WESLEY FOSSIL SITE-Venango; Wesley; 1 mile N of Wesley; private; no protection.
G30 G17

137. WHANN RUN/LOCKARD RUN-Venango; Eau Claire; 2 miles N of Lisbon; 110 Ac; private; no protection.
A12 G17, G10, OVT7, SAF23, SAF25 (K106)

WASHINGTON COUNTY

— ENLOW FORK OF WHEELING CREEK-See Natural Area #86.

138. HILLMAN STATE PARK-Washington; Burgettstown & Clinton; 3,654 Ac; partial protection.
OVT8

139. LABORATORY FOSSIL SITE-Washington; Washington East; 1.7 miles S of Washington; private; no protection.
G30 G17

WESTMORELAND COUNTY

140. BEAR CAVE-Westmoreland; Boliver & Wilpen; NE of Derry; private; no protection.
G9 G10, Z17, G17, G6

141. BEAR CREEK-Westmoreland; Ligonier; 6 miles SE of Rector; 76 Ac; Rolling Rock Farms; partial protection.
SAF24 SAF25, A12, G1, OVT11 (K106)

142. BEAVER RUN RESERVOIR-Westmoreland; Slickville; 3 miles W of Slickville; 400 Ac; water company; partial protection.
Z16

143. BIG OAK WOODS-Westmoreland; Ligonier; 2 miles E of Rector; 300 Ac; Rolling Rock Farms; partial protection.
SAF59 (K103)

144. BUFFALO NUT SANCTUARY-Westmoreland; Stahlstown; 3 miles W of Stahlstown; 53 Ac; Carnegie Museum of Natural History; complete protection.
OVT9 SAF52, SAF59, G1, G6, A12 (K103, K104)

145. CON CAVE-Westmoreland; Boliver; NE of Derry; private; no protection.
G9 G10, G6, G17, Z17

146. CONEMAUGH GORGE-Westmoreland; Boliver; NE of Derry; 3,000 Ac; State Game Commission; partial protection.
G10 G6, G17, SAF52, OVT19 (K104)

147. COON CAVE-Westmoreland; Boliver; NE of Derry; private; no protection.
G9 G10, G6, G17, Z17, Z9

148. COPPERHEAD CAVE-Westmoreland; Boliver; NE of Derry; private; no protection.
G9 G10, G6, G17, Z17, Z9

149. DELMONT FOSSIL SITE-Westmoreland; Slickville, just S of Delmont; PennDot; partial protection.
G30 G17

150. DUFF PARK-Westmoreland; Murrysville; just S of Murreysville; 148 Ac; Franklin Township; partial protection.
SAF52 OVT4, OVT8, SAF27, SAF61 (K104)

151. FURNACE WOODS NATURE RESERVE-Westmoreland; Ligonier; 1 mile N of Laughlintown; 133 Ac; Carnegie Museum of Natural History; complete protection.
SAF59 SAF52, G1, A12, A29, OVT4, OVT8, OVT11 (K103, K104)

152. GUFFY HOLLOW-Westmoreland; McKeesport; 4 miles SE of McKeesport; 100 Ac; private; no protection.
OVT4 G10, OVT9, SAF59 (K103)

153. HIGH ROCKS VALLEY-Westmoreland; Derry; NE of Derry; 200+ Ac; private; no protection.
OVT7 G17

--- LAUREL RIDGE STATE PARK-See Natural Area #52; 3,488 Ac.of the 15,436 Ac. total are in Westmoreland County.

154. LEMON HILL-Westmoreland; Wilpen; 3.6 miles SW of New Florence; 70 Ac; Girl Scouts of Western Pennsylvania; partial protection.
SAF59 SAF52, OVT4, OVT8 (K103, K104)

155. LEMON HOLE CAVE-Westmoreland; Boliver; NE of Derry; Torrance State Hospital; no protection.
G9 G10, G6, G17, Z17, Z9, G30

156. LINN RUN BOG-Westmoreland; Ligonier; 7 miles SE of Rector; 30 Ac; Forbes State Forest; partial protection.
A25 Z16

157. MOUNTAIN STREAMS-ROARING RUN VALLEY-Westmoreland; Seven Springs; E of Champion; 3,000 Ac; Western Pennsylvania Conservancy; complete protection.
OVT7 SAF27, SAF25, SAF52, G6, G10 (K104)

158. POWDERMILL NATURE RESERVE-Westmoreland; Ligonier; 3 miles S of Rector; 1,800 Ac; Carnegie Museum of Natural History; complete protection.
OVT8 SAF44, SAF52, SAF59, SAF27, G1, G6, A12, Z16, OVT19, OVT 6 (K103, K104)

159. SILVERMINE RUN-Westmoreland; Ligonier; 2 miles E of Rector; 300 Ac; Rolling Rock Farms; partial protection.
SAF60 A12, SAF24, G10 (K103, K102)

--- TURTLE CREEK-See Natural Area #15.