

CHAPTER 4

LAND STEWARDSHIP AND MANAGEMENT

4.1 Introduction

To fulfill the analytical mission of GAP, it is necessary to compare the mapped distribution of elements of biodiversity with their representation in different categories of land ownership and management. As will be explained in the Analysis section, these comparisons do not measure viability, but are a start to assessing the likelihood of future threat to a biotic element through habitat conversion--the primary cause of biodiversity decline. We use the term "stewardship" in place of "ownership" in recognition that legal ownership does not necessarily equate to the entity charged with management of the resource, and that the mix of ownership and managing entities is a complex and rapidly changing condition not suitably mapped by GAP. At the same time, it is necessary to distinguish between stewardship and management status in that a single category of land stewardship such as a national forest may contain several degrees of management for biodiversity.

The purpose of comparing biotic distribution with stewardship is to provide a method by which land stewards can assess their relative amount of responsibility for the management of a species or plant community, and identify other stewards sharing that responsibility. This information can reveal opportunities for cooperative management of that resource, which directly supports the primary mission of GAP to provide objective, scientific information to decision makers and managers to make informed decisions regarding biodiversity. It also is not unlikely that a steward that has previously borne the major responsibility for managing a species may, through such analyses, identify a more equitable distribution of that responsibility. We emphasize, however, that GAP only identifies private land as a homogenous category and does not differentiate individual tracts or owners, unless the information was provided voluntarily to recognize a long-term commitment to biodiversity maintenance.

After comparison to stewardship, it is also necessary to compare biotic occurrence to categories of management status. The purpose of this comparison is to identify the need for change in management status for the distribution of individual elements or areas containing high degrees of diversity. Such changes can be accomplished in many ways that do not affect the stewardship status. While it will eventually be desirable to identify specific management practices for each tract, and whether they are beneficial or harmful to each element, GAP currently uses a scale of 1 to 4 to denote relative degree of maintenance of biodiversity for each tract. A status of "1" denotes the highest, most permanent level of maintenance, and "4" represents the lowest level of biodiversity management, or unknown status. This is a highly subjective area, and we recognize a variety of limitations in our approach, although we maintain certain principles in assigning the status level.

Our first principle is that land ownership is not the primary determinant in assigning status. The second principle is that while data are imperfect, and all land is subject to changes in ownership and management, we can use the intent of a land steward as evidenced by legal and institutional factors to assign status. In other words, if a land steward institutes a program backed by legal and institutional arrangements that are intended for permanent biodiversity maintenance, we use that as the guide for assigning status.

The characteristics used to determine status are as follows:

- Permanence of protection from conversion of natural land cover to unnatural (human-induced barren, exotic-dominated, arrested succession.)
- Relative amount of the tract managed for natural cover.
- Inclusiveness of the management, i.e., single feature or species versus all biota.
- Type of management and degree that it is mandated through legal and institutional arrangements.

4.2 Mapping Standards

The WV-GAP land stewardship map was compiled from various paper and digital source maps with a cartographic scale of 1:100,000 or larger. The map was compiled in zone 17 of the Universal Transverse Mercator (UTM) map projection, using the 1927 North American Datum and meters as map units. The minimum mapping unit for stewardship parcels was 10 acres (approximately 4 ha.)

4.3 Methods

The land stewardship map is an integral map layer to WV-GAP. Stewardship data not only shows the geographic extent of lands owned and/or managed by particular entities, but generally includes administrative units within that extent (for example, Wilderness Areas within National Forests.) Land management status was assigned to each tract of land or administrative unit based on the written management plan (if in place), and general objectives and goals of the responsible entity. See [Appendix 4-1](#) for a flow chart of criteria used to determine management status. Analysis of biodiversity by management status of individual stewardship polygons is described in Chapter 5 of this report.

4.3.1 Land Stewardship Mapping

Various methods were used to map lands owned or managed by various entities in WV. Certain land parcels were available in digital format, while others were digitized by WV-GAP from paper maps.

The single largest stewardship entities in the state are the Monongahela and George Washington and Jefferson National Forests (GW-J NF.) Digital coverages of parcels owned by the Forest Service were obtained directly from these Forests. Parcel ownership

was originally digitized by the Forest Service based on USGS 1:24,000 7.5-minute series quad maps. Forest Service surface ownership parcels are considered accurate and complete as of May 1999 (GW-J NF) or December 1998 (Monongahela NF.) Private inholdings within National Forest boundaries were determined from intersection of the National Forest proclamation boundary with National Forest surface ownership parcels.

National Wildlife Refuge parcels for the Canaan Valley NWR were obtained from the National U.S. Fish and Wildlife Service (USFWS) Region 5 Realty office, Hadley MA, and are current as of 1999. USFWS personnel digitized these parcels at 1:24,000 scale. Additional parcels may be purchased in the future for the Canaan Valley NWR, which would necessitate updates to the WV-GAP stewardship layer. Parcels owned within the Ohio River Islands National Wildlife Refuge were identified from mapped islands in the EPA River Reach version 3 coverage for WV. For both National Wildlife Refuges in West Virginia (Canaan Valley and the Ohio River Islands), we included the polygons for both the land parcels owned by the Refuge system and those parcels within the refuge proclamation boundary that remain privately owned.

Other Federal lands (National Park Service, etc.), state parks, and state forests were digitized by WV-GAP from 1:100,000 and 1:24,000 scale USGS topographic maps. Miscellaneous state lands were digitized from paper maps at varying scales provided by the WV Department of Agriculture. West Virginia University property in Morgantown and throughout the state was digitized by WV-GAP from paper maps provided by the University. Nature Conservancy holdings were digitized from outlines on paper maps provided by Tina Hall of The Nature Conservancy. The boundary of the Westvaco Wildlife and Ecosystem Research Forest was provided in digital form by the Westvaco Corporation.

Digital maps of certain Wildlife Management Areas (WMAs) were provided by the WV DNR. Several WMAs are still known to be missing from the WV-GAP stewardship map and are currently being mapped by WV DNR, including Allegheny WMA, B.J. Taylor WMA, Cecil H. Underwood WMA, Fort Mill Ridge WMA, Horse Creek WMA, O'Brien Lake WMA, Stumptown WMA, and Upper Mud River WMA.

Certain water features (lakes, reservoirs) were extracted from the 1:100,000 scale EPA River Reach version 3 coverage for WV. Stonewall Jackson Lake, a reservoir completed since the last update of the River Reach source data, was added by digitizing the lake outline from paper source maps (with 1:24,000 topographic map background) provided by the Army Corps of Engineers, Pittsburgh District.

4.3.2 Management Status Categorization

Parcels were assigned management status according to WV-GAP categories (see [Table 4-1](#).) The status categories used can generally be defined after Scott et al. 1993, Edwards et al. 1995, and Crist et al. 1995. A flowchart detailing the decision process used to label parcels with management status is found in [Appendix 4-1](#).

We have added two management status categories specific to West Virginia: Status 4a and Status 4b. These categories were added to distinguish private land parcels within National Forest or National Wildlife Refuge (NWR) proclamation boundaries (inholdings) from other private lands. For comparison with other states not using these status definitions, these parcels may be included in Status 4. Management status assignment is summarized in [Table 4-2](#).

Lakes and reservoirs were attributed with management status 4, regardless of the management status of the surrounding areas.

Table 4-1. Land management status definitions used by WV-GAP (after Scott et al. 1993.)

Status 1: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, and intensity) are allowed to proceed without interference or are mimicked through management.

Status 2: An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive use or management practices that degrade the quality of existing natural communities.

Status 3: An area having permanent protection from conversion of natural land cover for the majority of the area, but subject to extractive uses of either a broad, low-intensity type or localized intense type. It also confers protection to federally listed endangered and threatened species throughout the area.

Status 4: Lack of irrevocable easement or mandate to prevent conversion of natural habitat types to anthropogenic habitat types. Allows for intensive use throughout the tract. Also includes those tracts for which the existence of such restrictions or sufficient information to establish a higher status is unknown.

Status 4a: (WV-GAP) Unknown or yet to be determined. Privately held lands within proclamation boundaries of National Forests or National Wildlife Refuges. Lands within National Wildlife Refuges in WV, but lacking established management plans.

Status 4b: (WV-GAP) Other private lands, not within proclamation boundaries of National Forests or National Wildlife Refuges.

Table 4-2. Assignment of land stewardship categories to WV-GAP management status categories. All private lands not indicated below were assigned to Status 4b.

Status 1	Status 2	Status 3	Status 4	Status 4a
USFS Wilderness Areas	NPS National Scenic Rivers, National Rivers	NPS National Historic Park	Private corporation research areas	USFWS National Wildlife Refuges
Nature Conservancy Preserve Areas	WV State Parks	NPS National Recreation Areas USDA National Forests USDA National Forest National Recreation Areas USDA National Forest Research Forest WVDNR Wildlife Management Areas (WMAs) WVDNR State Forests	National Science Foundation Open water Department of Defense USDA Research Areas US Geological Survey State of West Virginia West Virginia University	Areas within USFWS Proclamation Boundaries Private inholdings within National Forests

4.4 Results

Federal and state lands make up approximately 9.54 % of West Virginia's area (see [Table 4-3](#).) Federal lands (6.2 % of WV) include two National Forests, as well as four National Park Service units, two National Wildlife Refuges, and several smaller miscellaneous parcels. State lands (2.84%) include state forests, parks, and Wildlife Management areas. Other ownership categories include 23 Nature Conservancy areas, the Greenbank National Radio Astronomy Observatory (National Science Foundation), areas within National Wildlife Refuge proclamation boundaries, and a private research forest (Westvaco's WERF.) Lakes and reservoirs make up 0.18 % of West Virginia's surface area.

Federal lands are centered in or near the Monongahela National Forest, in the Allegheny Mountains in the east-central portion of the state. Federal lands are also found along scenic river gorges (New, Gauley, Bluestone) in southeastern West Virginia. State lands are distributed throughout the state.

The distribution of WV-GAP stewardship parcels is widely varied across the state (See [Figure 4-1](#).) The largest status 1 lands in the state (having the highest potential for biodiversity conservation) are Wilderness Areas in the National Forests of West Virginia (see [Figure 4-2](#).) Nature Conservancy preserves tend to be located in the Allegheny mountain areas in the eastern third of the state, with the exception of the Hungry Beech preserve in Roane County and two properties near the southeastern border of the state in Monroe and Mercer counties.

Very few of status 1 and 2 lands are over 10,000 ha in size, as shown by the size frequency distribution of status 1,2,3, and 4 lands in WV (see [Figure 4-3](#).)

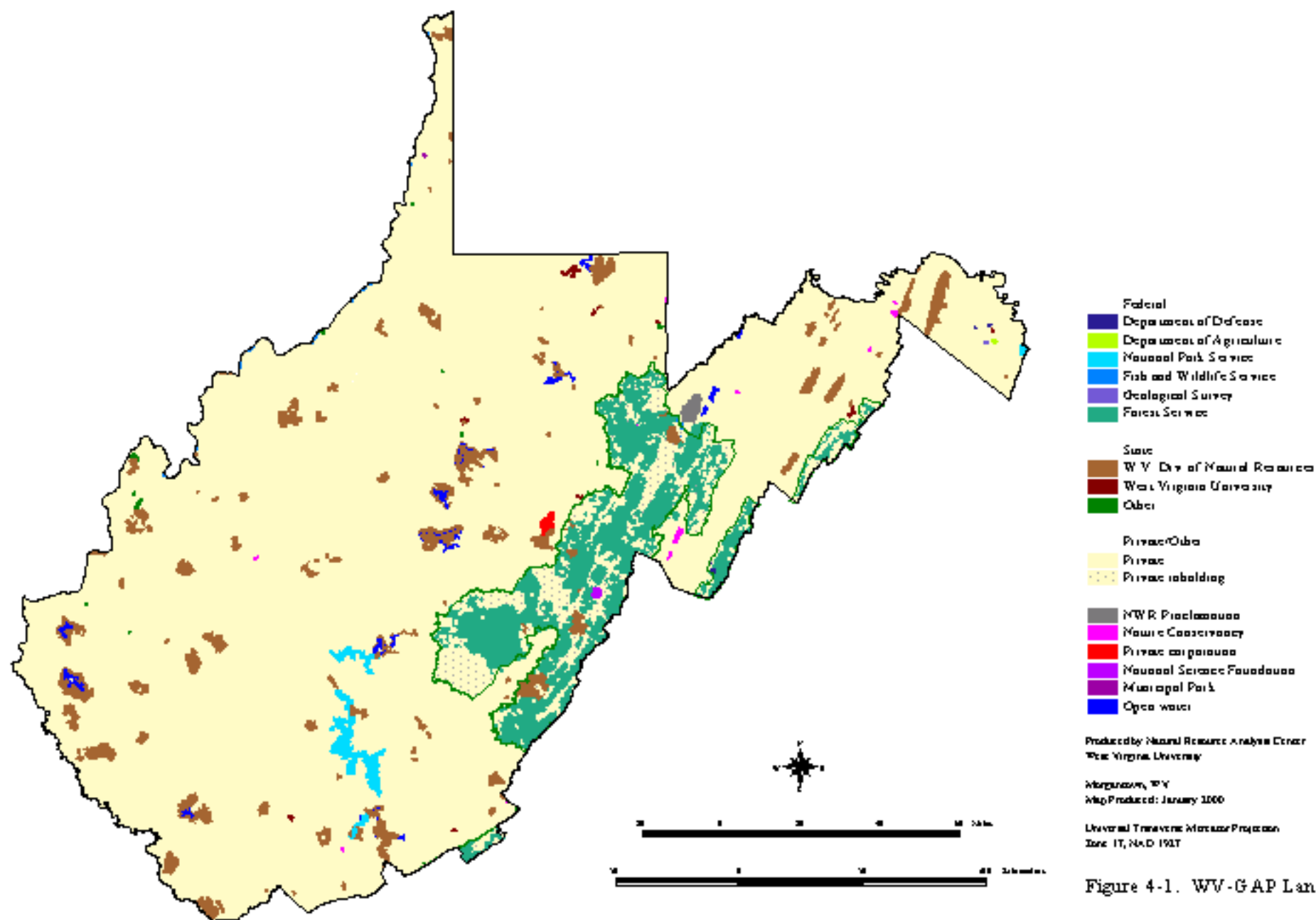
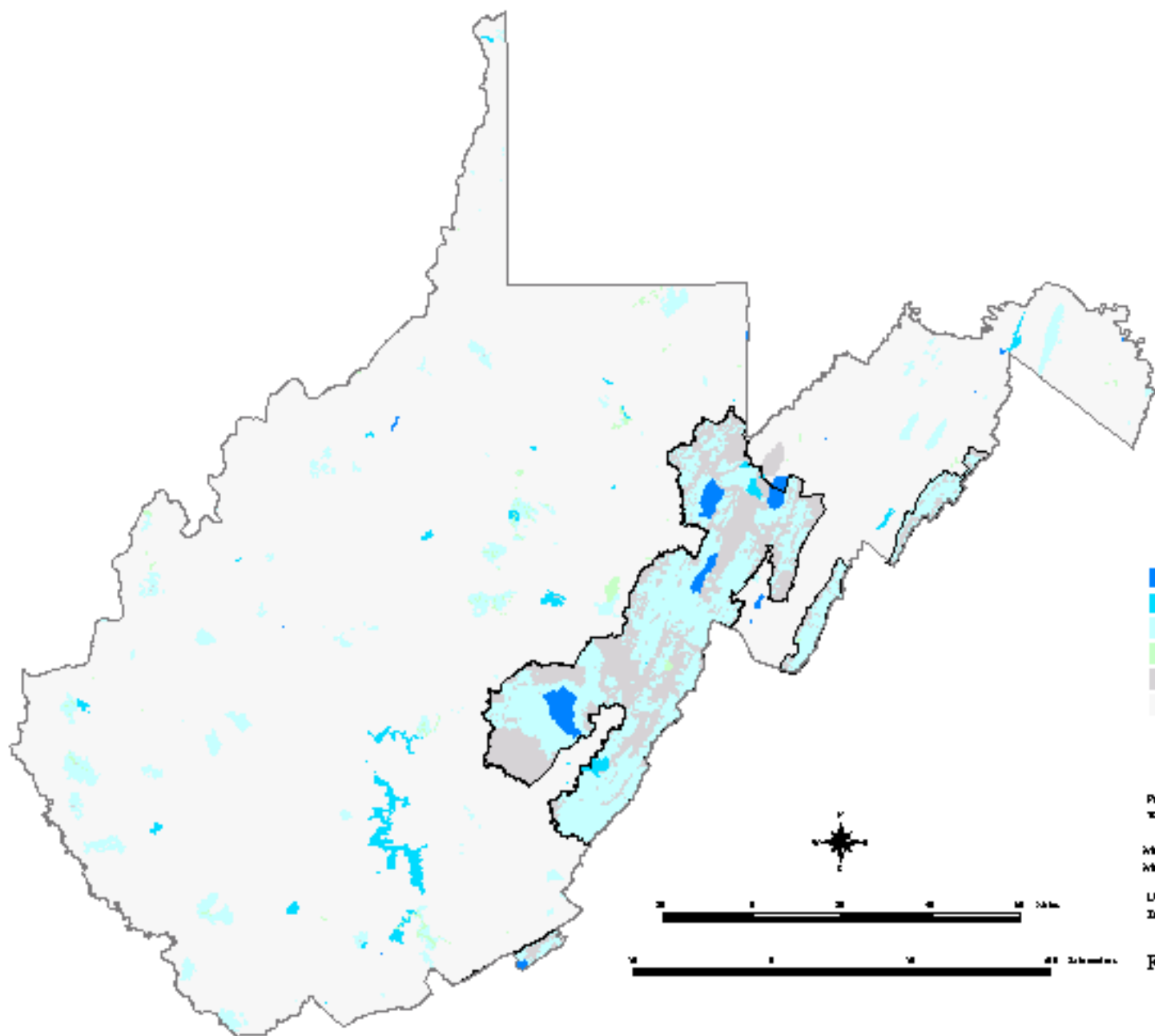


Figure 4-1. WV-GAP Land Stewardship



- Status 1
- Status 2
- Status 3
- Status 4
- Status 4a
- Status 4b

Produced by Natural Resource Analysis Center
West Virginia University

Morgantown, WV
Map Produced: January 2000

Universal Transverse Mercator Projection
Zone 17, NAD 1983

Figure 4-2. Management Status for West Virginia

Table 4-3. Area (ha) and percent (%) of West Virginia's land ownership categories. Accuracy discussed in section 4.5. Subtotals for major categories (private, federal, state) are indicated in bold; subtotals for sub categories (Forest Service, Department of Interior, etc.) are indicated in italics.

	Code	Area (ha)	%
PRIVATE/OTHER		5,646,950	89.95
Private land	7000	5,317,400	84.70
Private inholding	7000	311,137	4.96
Private corporation	7000	3,425	0.05
Nature Conservancy	6300	2,878	0.05
National Science Foundation	6000	1,084	0.02
Lake	8000	10,853	0.17
Wheeling Park Commission	5100	173	0.00
U.S. FEDERAL GOVERNMENT		452,772	7.21
Department of Defense	1500	324	0.01
USDA Research Area	1000	216	0.00
<i>U.S. Department of Interior</i>		<i>29,573</i>	<i>0.47</i>
National Historic Park, NPS	1605	645	0.01
National Scenic River, NPS	1615	1,419	0.02
National Recreation Area, NPS	1613	26,542	0.42
National Wildlife Refuge, FWS	1301	863	0.01
U.S. Geological Survey	1000	104	0.00
<i>U.S. Forest Service</i>		<i>422,660</i>	<i>6.73</i>
National Forest	1400	376,861	6.00
National Forest Wilderness Area	1412	35,684	0.57
National Forest National Recreation Area	1408	10,115	0.16
STATE OF WEST VIRGINIA		352,132	2.84
State of West Virginia	3000	1,625	0.03
West Virginia University	3200	2,314	0.04
<i>W.V. Division of Natural Resources</i>		<i>174,097</i>	<i>2.77</i>
WVDNR State Park	3100	27,701	0.44
WVDNR State Forest	3100	32,110	0.51
WVDNR Wildlife Management Area	3300	114,286	1.82
TOTAL (All categories)		6,277,757	100.00

Private lands outside of National Forest or NWR proclamation boundaries make up almost 85% of West Virginia (see Table 4-4.) Very little of the state (0.61%) is classified as status 1, having the highest potential for biodiversity conservation. Approximately 5% of the state is privately owned, but within the boundaries of National Forests or NWR proclamation boundaries (status 4a.)

Table 4-4. Total area (ha) and percentage (%) of lands within WV-GAP management status categories.

Management Status	Total Area (ha)	% of State
1	38,561	0.61
2	56,583	0.90
3	534,193	8.51
4	19,944	0.32
4a	311,077	4.96
4b	5,317,400	84.70
Total	6,277,757	100.00

Over 50% of West Virginia is below 400m in elevation, with just over 4 % of the state over 1000m (see Table 4-5.) Over 60% of West Virginia's status 1 lands are over 1000 m in elevation. Under 2% of status 2 lands are over 1000 m.

Table 4-5. Total area of management status categories 1 and 2 by elevation ranges (m.) Totals given on the right are for all management status categories.

Elevation Range (m)	Status 1 (ha)	% of Status 1	Status 2 (ha)	% of Status 2	Total (all status)	% of State's Area
0-200m	181	0.47	2,386	4.22	747,925	11.91
200-400m	1,055	2.74	14,435	25.51	2,521,610	40.17
400-600m	321	0.83	17,015	30.07	1,203,925	19.18
600-800m	2,055	5.33	16,115	28.48	1,079,805	17.20
800-1000m	11,004	28.54	5,880	10.39	475,338	7.57
1000-1200m	20,718	53.73	626	1.11	210,883	3.36
1200-1400m	3,226	8.37	114	0.20	37,830	0.60
1400m +	0	0.00	17	0.03	260	0.00
TOTAL	38,561		56,586		6,277,576	100.00