

PENNSYLVANIA GAME COMMISSION

WILDLIFE DIVERSITY SECTION

**ALLEGHENY WOODRAT
HABITAT SITE SURVEY**

CODE MANUAL

This manual provides instructions, definitions
and codes for completing the Allegheny Woodrat
Habitat Site Survey



The Allegheny
Saxicole or

← THE
ĀSAX

Saxicole: Dwelling in stony
places; something that lives
on or among rocks; a
saxicolous species.

Chittering and twittering,
Chompin and stompin,
The āsax is home.
In the shadow of stone

WOODRAT HABITAT SITE SURVEY

Use the accompanying Woodrat Survey Code Booklet to complete this form.

Habitat Site Name: _____ Trap-site Number: _____ Date: _____

Ownership (circle one): Public, Private, Both Access (Name, Address Telephone): _____

Location: _____ N or _____ S and _____ E or _____ W of: _____

Surveyors: _____

Effort: # of surveyors x survey minutes = _____ minutes. Was the site(s) previously surveyed? Yes No

Conservation Mgmt. Area (4 letters, see Appendix 1): _____ Habitat Site Code (if known): _____

County: _____ Quadrangle: _____ Map Photocopy attached? Yes No

Habitat Site Size (m): Longest Length: _____ Average Width: _____ Width range: _____

Activity Extent (m): Longest Length: _____ Average Width: _____ Width range: _____
(Estimate the length & width of rectangle that would include all Activity Centers within Habitat Site)

Latitude _____°-----'-----" & Longitude _____°-----'-----"
(Center of Habitat Site in Degrees, Minutes and Seconds, NAD27)

Elevation Range: _____ to _____ meters. Percent Slope: _____% to _____%

Aspects (degrees): southerly aspects: _____% _____° northerly aspects: _____% _____°
(135°-225°) (315°-45°)

easterly aspects: _____% _____° westerly aspects: _____% _____°
(45°-135°) (225°-315°)

Topography (ridge/valley-side, ridge top, river gorge, water gap, etc.): _____

Surface Rock Habitat Types: List the four most common surface rock habitat types (and estimate the percent coverage of each) starting with the most common (see Table 1):

- 1) Code # _____ % _____, 2) Code # _____ % _____,
- 3) Code # _____ % _____, 4) Code # _____ % _____

Geological formation: _____

Nearest mapped water: Name: _____ Distance to: _____ m

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Forest Fragmentation Code: _____ Two-digit Habitat Disturbance code: _____

Anderson Level III cover code on site: _____ and adjacent to site: _____

Tree canopy coverage overtop Habitat Site: _____%

Vegetation on and within 100 meters of the Habitat Site:

Trees Species (list most common first and least common last): _____

Shrub, Vine and Briar (Rubus) Species: _____

Herbaceous Species: _____

General Description of Surrounding Habitat (>100m & <500m): _____

If applicable: this Habitat Site replaces (merges) the following Sites (enter the Site names):

Comments, e.g. threats to site, unusual tree mortality, large population of porcupines (tally number of dens), snake species observed, droppings of predators noted etc.

ACTIVITY CENTERS or POTENTIAL ACTIVITY CENTERS (circles with a 15m radius)
Establish up to 10 ACs and/or PACs for every 1 km of Habitat Site length.

No.	GPS Latitude	GPS Longitude	# Toilet Areas		# Midden-caches		#Nests/Hutches		Rock Code	% Canopy Coverage
			Fresh	Old	Fresh	Old	Fresh	Old		
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
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14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
TOTAL =										

FORM PGC 4150 wdrat

MIDDEN-CACHE CONTENTS COMBINED FOR ALL ACTIVITY CENTERS	
Green Vegetation & Buds	
Ferns	
Hard Mast	
Soft Mast	
Other Seeds	
Fungi & Lichens	
Misc. (Sticks etc.)	
Raccoon Feces	

WOODRAT HABITAT SITE SURVEY CODE BOOKLET

This booklet will help you to complete the accompanying woodrat site survey form. Some questions are self-explanatory and therefore not covered here. The site survey form should be completed for all initial surveys, resurveys, and trapping surveys of suitable rocky habitat even if no woodrats were found.

Important Definitions:

Activity Center: Activity centers are overtop or near subsurface woodrat nesting or denning sites. Activity centers are characterized by observable woodrat sign in the form of toilet area(s) and midden-cache(s) linked in most cases to a complex of surface rocks and fissures or to a cave/mine entrance zone. The estimated center of activity is GPSed. Then all toilet areas and midden-caches within a 15 m radius of this GPS point are tallied. Multiple Activity Centers within the same Habitat Site should not overlap. Repeatedly or perennially used Activity Centers likely consist of an adult female and her young. Older daughters are tolerated nearby. In essence, Activity Centers (previously referred to as den sites) contain a breeding assemblage. Males disperse from, visit, travel through, or occasionally occupy vacant activity centers. Generally, prime den sites or Activity Centers are defended and are rarely closer than 30 m to one another.

Potential Activity Center: Some areas look like good woodrat habitat but fail to have any sign of being used by woodrats. In these survey instances, the most complex surface rock found, characterized by rock overhangs, ledges, small caves and numerous fissures, can be defined as a Potential Activity Center.

Habitat Site: A Habitat Site is a variable sized area of more or less contiguous surface rock without a break in the surface rock of 200 m or more. A Habitat Site is an island or a “patch” of rock (sometimes referred to as a rock pile) or a cluster of islands. A Habitat Site and its adjacent fringing apron (ecotone) of rock and non-rock surface area has all the necessary resources for the persistence of a local subpopulation, and it is separated by unsuitable denning habitat from other Habitat Sites. At any given time, a Habitat Site may be occupied or empty. Adjacent Habitat Sites are separated by at least 200 m of non-surface rock habitat or by a substantial barrier in the form of a major, hardtop road or wide stream. Habitat Sites contain one or more Activity Centers or Potential Activity Centers. An active Habitat Site contains a woodrat subpopulation which may be as small as a single breeding assemblage or contain multiple breeding assemblages. The most common kinds of movements by woodrat are foraging forays within and on the fringe of the Habitats Site, den shifts within a Habitat Site, and short distance dispersal within larger Habitat Sites. See Figure 2.

Metapopulation Area: Metapopulation Areas are separated from the nearest, adjacent Metapopulation Area by at least 10 km of non-woodrat habitat or a significant barrier to dispersal, e.g. a river or farmed valley bottom. A Metapopulation Area contains at least one but usually numerous topographically related woodrat Habitat Sites; some Habitat Sites may not be occupied. A Metapopulation Area contains a metapopulation defined as a set of subpopulations (one per active Habitat Site) where typically migration from one subpopulation to at least some other subpopulations (Habitat Sites) is possible. The subpopulations are able to exchange individuals and recolonize Habitat Sites in which the species has recently become extinct.

Conservation Management Area: A Conservation Management Area contains physiographically related Metapopulation Areas. Administratively, a Conservation Management Area represents an economy of scale; and different Metapopulation Areas within a Conservation Management Area are likely to be impacted similarly regarding regional threats and public land management.

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Habitat Site Name: Give each site a short individual name consisting of no more than two words. Group names (e.g. Big Mountain #4) may also be appropriate. Resurveys of previous Sites may require these Sites to be merged under a new name because previous adjacent Sites may not have the required ≥ 200 m of non-surface rock between them. The ≥ 200 m rule is new as of the year 2006. For example, Ellendale 1 through Ellendale 17 (absent ≥ 200 between adjacent Sites) would be merged into a single Habitat Site renamed Ellendale Merged or Ellendale A.

Trap-site Number: Enter if known otherwise leave blank, a number will be assigned later.

Location: Miles or kilometers due north or south and due east and west of nearest town on the topographic map.

Conservation Management Area: Use only the approved name or abbreviation from Appendix I and Figure 1.

Habitat Site Code: Enter if known, otherwise leave blank and a code will be assigned later.

Habitat Site size: See definition of Habitat Site. The longest length is measured along or close to the contour. Find the end of surface rock adjacent to an area spanning at least 200 m of mostly non-surface rock. The longest length of the surface rock island, without a break of 200 m or more, is estimated to the nearest 50 m, but not zero. Habitat Sites longer than 2 km (about a mile) should be GPSed at both ends and the longest length should be taken off of a topographic map rather than visually estimated. The width of a surface rock island is usually but not always at right angles to the contour, i.e. downhill or uphill. The average width in a few instances will be longer than the length. Estimate the average width of the Habitat Site to the nearest 25 m but not zero. The width range is the shortest and widest width of the surface rock island.

Area of Occupancy or Activity Extent: Estimate the length and width of a rectangle that includes all Activity Centers that have evidence (new and/or old) of being used by woodrats.

Latitude and Longitude: On the contour, estimate the middle of the Habitat Site and GPS this point.

Elevation Range, Example: 332' to 610' **Percent Slope, Example (%)**: 10% to 15%.

Aspects (degrees), Example: southerly aspects: 100 % 180°; in this example 100% of the Habitat Site was facing due south.

northerly aspects	clockwise 315° to 45°
southerly aspects	clockwise 135° to 225°
easterly aspects	clockwise 45° to 135°
westerly aspects	clockwise 225° to 315°

Note: numerous ridgetop sites will have contrasting aspects.

Classification of Rocky Habitat: This code can be determined with the use of Appendix II. Key down from column 1 to column 3; the number in the third column is the code number(s) to use. Spaces are available for only the four most common rocky habitat types.

Geological formation: This data comes from the Preliminary Atlas of Geologic Quadrangles for Pennsylvania, Map 61 from the Pennsylvania Geological Survey; refer to the DCNR website. If not available, briefly describe rock (limestone outcrop, sandstone talus, etc.).

Nearest mapped water: Provide the distance to and name of the nearest stream or other body of water taken from the 7.5' quadrangle map.

Forest Fragmentation: This is a basic distance code to measure massive encroachment of agricultural/urban areas into the forest cover type. For this reason consider only agricultural/urban areas >100 hectares. Usually this entry will be the closest measurement from the Habitat Site to the edge of the forest cover type where it meets the expansive, developed, cleared land of the valley.

<u>Code Number</u>	<u>Distance from >100 ha opening</u>	<u>Code Number</u>	<u>Distance from >100 ha opening</u>
1	On site	5	>1km to 2km
2	≤ 100m	6	>2km to 3km
3	>100m to 500m	7	>3km to 5 km
4	>500m to 1km	8	>5km

Normally the measurement can be taken off a 7.5 minute topographic map (closest distance to edge of white areas >100 hectares). However, this is not always the case. For example, large housing developments (>100ha.) in a forested site may still be colored green on a topographic map.

Linear agricultural/urban areas >100 hectares should be considered. Example: an agricultural/urban river bottom that measures 250m x 5,000m would qualify for this entry.

For this code, do not measure the distance to small housing developments, strip mines, clearcuts, forest clearings or other small disturbances <100 hectares. These smaller site disturbances should be recorded in the following "Two-digit Habitat Disturbance Codes."

Two-digit Habitat Disturbance Code: Disturbance code that may affect the Habitat Site. Space is available to list up to 3 disturbance codes. Get from Appendix IV.

Anderson Level III land cover code: Determine from Appendix III. Key down from column 1 to column 3; use the 3 digit number (code number) in the third column.

Tree canopy coverage overtop Habitat Site: Estimate to nearest 10%.

ACTIVITY CENTERS and POTENTIAL ACTIVITY CENTERS (PAC): (see definitions) this is a major change compared to previous (pre-2006) surveys.

Within Habitat Sites, Activity Centers are over-top or near subsurface woodrat nesting or denning sites. Activity Centers are characterized by observable woodrat sign in the form of toilet area(s) and midden-cache(s) linked in most cases to a complex of surface rocks and fissures or to a cave/mine entrance zone. Some areas look like good woodrat habitat but fail to have any sign of being used by woodrats. In these survey instances, the most complex surface rock found, characterized by rock overhangs, ledges, small caves and numerous fissures, can be defined as a Potential Activity Center (PAC). The estimated center of activity (actual or potential) is GPSed. Then, if present, all toilet areas and midden-caches within a 15 m radius of this GPS point are tallied. Multiple Activity Centers and/or PACs within the same Habitat Site

should not overlap. Establish up to 10 Activity Centers and/or PACs for every 1 km of Habitat Site length.

- Step 1: Starting at either end of the Habitat Site's "longest length," look for the closest Activity Center or Potential Activity Center. GPS the Activity Center or PAC.
- Step 2: Tally all toilet areas and midden-caches within 15m of the GPSed spot. Also note the rock type (Appendix 2) within and the tree canopy coverage over-top the Activity Center or PAC.
- Step 3: Look for the next closest, non-overlapping (≥ 30 m from nearest other Activity Center or PAC) Activity Center or PAC and continue in the fashion until no more qualifying Activity Center or PACs exist on the Habitat Site. Note, for every 1 km of Habitat Site length, the Centers (from 1 to 10) can be: 1) all Activity Centers with fresh and/or old signs of woodrat activity; **or** they can be: 2) all Potential Activity Centers with qualifying surface rock but no sign of ever being used by woodrats, **or** 3) very likely they will be a combination of 1 and 2. Ten is the maximum number of Centers to GPS within any 1 km stretch of Habitat Site.

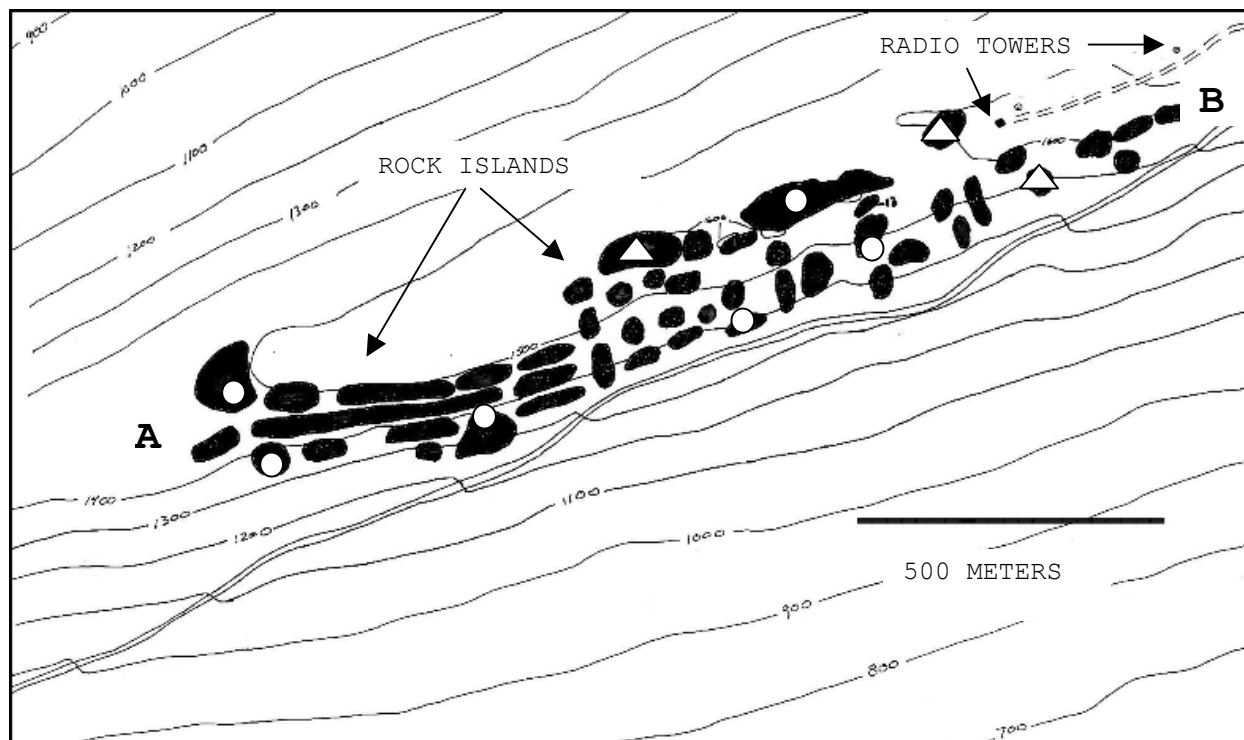
Midden-cache contents: List by indicated category. Be as specific as possible, i.e. sassafras leaves, blackberry twigs, tulip poplar fruits, hay-scented ferns. If you are not sure of the identity of an item, collect it and have it identified.

Vegetation: Be specific. Note anything that is exceptionally abundant such as large patches of fern or blueberries.

Mail Completed Form to:

The Pennsylvania Game Commission
Bureau of Wildlife Management
Wildlife Diversity Section
2001 Elmerton Avenue
Harrisburg, PA 17110-9797

Figure 1. Example: The Ellendale Towers Habitat Site.



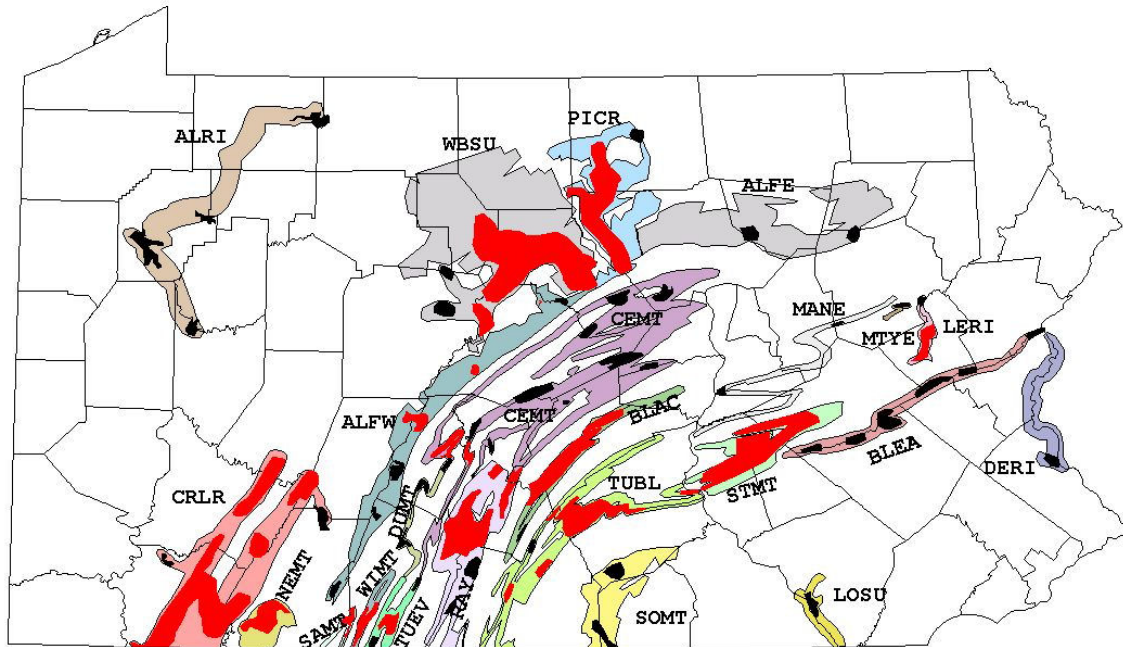
○ = Activity Center with fresh and/or old woodrat sign

△ = Potential Activity Center with “good” rock

Explanation:

- Ellendale Towers (the Habitat Site Name) is a cluster of rock islands treated as a single Habitat Site because each island is within 200 m of one or more adjacent islands.
- The Habitat Site Length is measured from A to B.
- Proceeding from A towards B, 7 Activity Centers and 1 Potential Activity Center were GPSed in the first kilometer. Two Activity Centers and 2 Potential Activity Centers were GPSed in the next 500 meters.

Figure 2. A 2006 map illustrating 23 Conservation Management Areas and 78 Metapopulation Areas.



- Metapopulation Areas**
- Active (N=29)
 - Inactive (N=49)
 - PA Countys
- Conservation Management Areas**
- ALFE=Allegheny Front East
 - ALFW=Allegheny Front West
 - ALRI=Allegheny River
 - BLAC=Blacklog Mountain
 - BLEA=Blue Mountain East
 - CEMT=Central Mountains
 - CRLR=Chestnut/Laurel Ridges
 - DERI=Delaware River
 - DUMT=Dunning Mountain
 - LERI=Lehigh River
 - LOSU=Lower Susquehanna R.
 - MANE=Mahantango/Nescopck Mt.
 - MTYE=Mount Yerger
 - NEMT= Negro Mountain
 - PICR=Pine Creek
 - RAYS=Raystown Branch
 - SAMT=Savage Mountain
 - SOMT=South Mountain
 - STMT=Stony Mountain
 - TUBL=Tuscarora/Blue Mts.
 - TUEV=Tussey/Evitts Mts.
 - WBSU=W. Br. Susquehanna
 - WIMT=Wills Mountain

Table 1. Classification of surface rock habitat.*Enter as a three digit code from the following table.*

<u>HABITAT TYPE</u>	<u>QUALITY OF HABITAT</u>	<u>SIZE OF ROCK</u>
1 talus	11 bare rock, deep interstices	111 blocks less than 1 meter 112 blocks 1-3 meters 113 blocks 3-5 meters
	12 bare rock, shallow interstices	121 blocks less than 1 meter 122 blocks 1-3 meters 123 blocks 3-5 meters
	13 rock covered by organic material including humus, leaves, moss, with deep interstices	131 blocks less than 1 meter 132 blocks 1-3 meters 133 blocks 3-5 meters
	14 rock covered by organic material including humus, leaves, moss, with shallow interstices	141 blocks less than 1 meter 142 blocks 1-3 meters 143 blocks 3-5 meters
2 rock city, large float blocks	21 numerous overhangs, crevices, and "caves"	211 blocks 5-10 meters 212 blocks 10 meters+
	22 few or no overhangs, crevices, and "caves"	221 blocks 5-10 meters 222 blocks 10 meters+
3 cliffs, rock outcrops	31 numerous overhangs, crevices, and "caves"	311 less than 3 meters high 312 3+ meters high
	32 few or no overhangs, crevices, and "caves"	321 less than 3 meters high 322 3+ meters high
4 Cave or mine entrance zone	41 rarely visited, may be gated	411 entrance 0-2 meters 412 entrance 2+ meters
	42 occasionally visited	421 entrance 0-2 meters 422 entrance 2+ meters
	43 active, heavily visited or commercialized	431 entrance 0-2 meters 432 entrance 2+ meters
Quarry or mine pit	51 highwall with numerous crevices, boulders, etc.	511 less than 3 meters high 512 3+ meters high
	52 highwall with few or no crevices, boulders, etc.	521 less than 3 meters high 522 3+ meters high
6 Other man made rocky habitat such as stone walls, railroad and road cuts, buildings, etc.	61 few or no suitable crevices, overhangs, or other interstices	611 less than 3 meters high 612 3+ meters high
	62 numerous suitable crevices, overhangs, or other interstices	621 less than 3 meters high 622 3+ meters high

Table 2. Anderson Level III Land-cover Codes Pertinent To Woodrat Habitat

4 Forest Land	41 deciduous forest	411 sapling stage: shrub land layer moderate to dense 412 sapling stage: grazed and/or shrub layer sparse 413 pole stage: shrub layer moderate to dense 414 pole stage: grazed and/or shrub layer sparse 415 mature stage shrub layer moderate to dense 416 mature stage: grazed and/or shrub layer sparse
	42 evergreen forest land	421 sapling stage: shrub land layer moderate to dense 422 sapling stage: grazed and/or shrub layer sparse 423 pole stage: shrub layer moderate to dense 424 pole stage: grazed and/or shrub layer sparse 425 mature stage shrub layer moderate to dense 426 mature stage: grazed and/or shrub layer sparse
	43 mixed forest land	431 sapling stage: shrub land layer moderate to dense 432 sapling stage: grazed and/or shrub layer sparse 433 pole stage: shrub layer moderate to dense 434 pole stage: grazed and/or shrub layer sparse 435 mature stage shrub layer moderate to dense 436 mature stage: grazed and/or shrub layer sparse
7 Barren land	74 bare exposed rock 75 strip mines, quarries and grade pits 76 transitional areas 77 mixed barren land	740 bare exposed rock 750 strip mines, quarries and grade pits 760 transitional areas 770 mixed barren land

Table 3. Classification of Habitat Disturbance.

Use the category(s) that best defines the site:

Code Number	PROXIMITY OF DISTURBANCE	Code Letter	TYPE OF DISTURBANCE
1	On-site	A	Dumping
2	<100m	B	Party spot
3	100m to 500m	C	Buildings
4	>500m to 1km	D	Agriculture
5	>1km to 2km	E	Utility rights-of-way
6	No significant disturbance	F	Railroad rights-of-way
		G	Improved roads
		H	Unimproved roads
		I	Recreation area
		J	Mining
		K	Fire
		L	Main logging haul road
		M	Concentrated tree mortality
		N	No significant disturbance

Example 1: Pastureland approximately 600 meters from suitable rocky habitat would be coded as **4D**.

Example 2: A rock outcrop/cliff used for beer parties would be coded **1B**.

Example 3: Excellent rocky habitat surrounded by uninterrupted forest for 2 or more kilometers in every direction would be coded **6N**.

Example 4: A main logging haul road and log loading site within 300 meters of the edge of the Habitat Site would be coded **3L**.

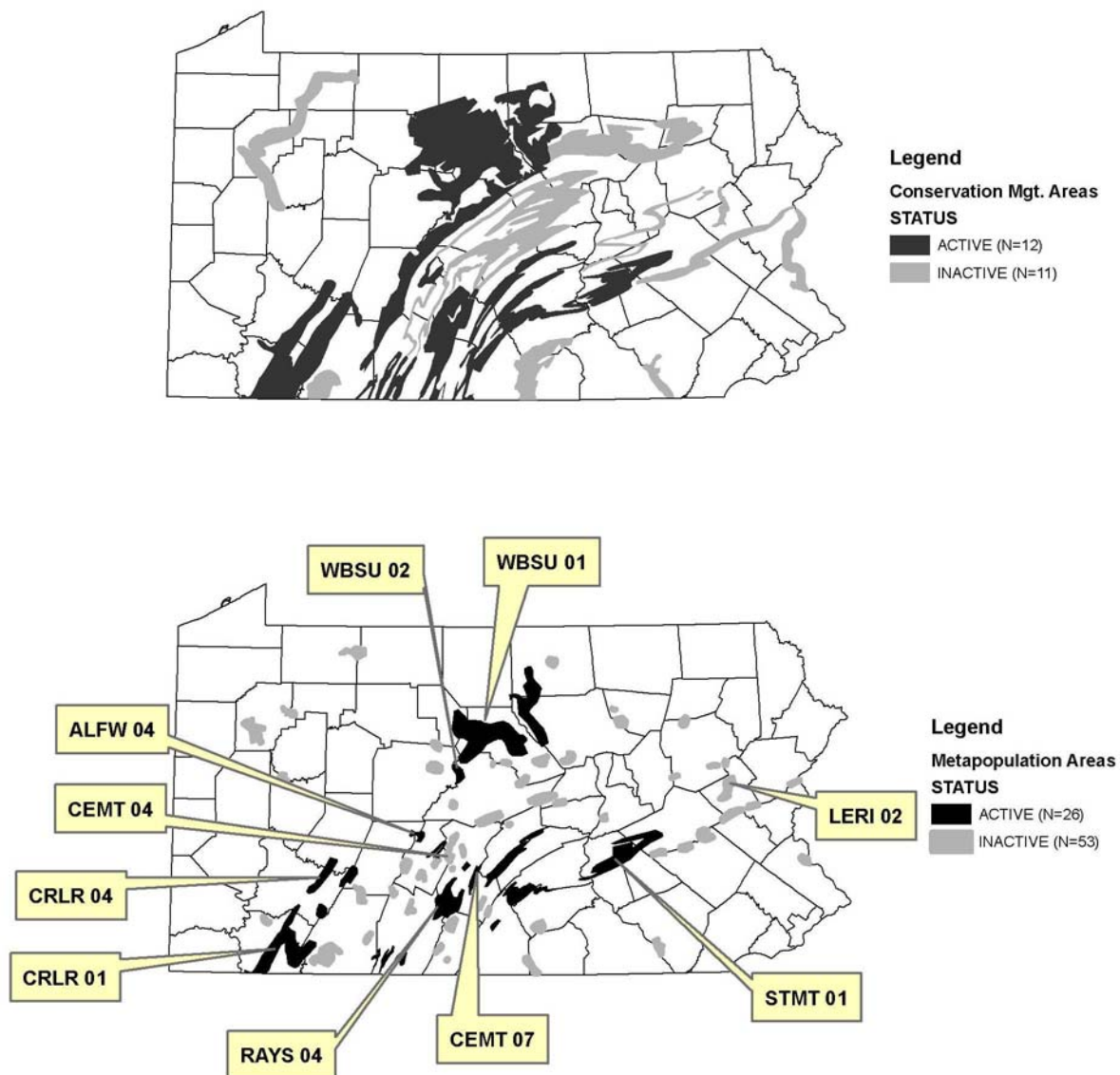


Figure 1. Locations of Allegheny Woodrat conservation management areas and metapopulation areas. Metapopulation area LERI 02 has been re-classed from active to inactive based on this period's surveys. Metapopulation areas sampled this period (Table 1) are labeled.