Report on a Breeding Landbird Survey at the Putney Mountain Unit of the Silvio O. Conte National Fish and Wildlife Refuge – 2001

Sebastian Lousada and Dan Lambert
Vermont Institute of Natural Science
27023 Church Hill Rd
Woodstock, VT 05091

PURPOSE

During the spring of 2000, the Vermont Institute of Natural Science (VINS) conducted its first breeding landbird survey at the Putney Mountain Unit (Tract 15) of the Silvio O. Conte National Fish and Wildlife Refuge (Hunt and Lambert 2000). In 2001 a second survey was conducted. Like the first, its purpose was to document the occurrence, distribution and relative abundance of landbird species. Survey data will contribute to a baseline for future monitoring and will guide development of management goals. The Conte Refuge provided funding support for this investigation.

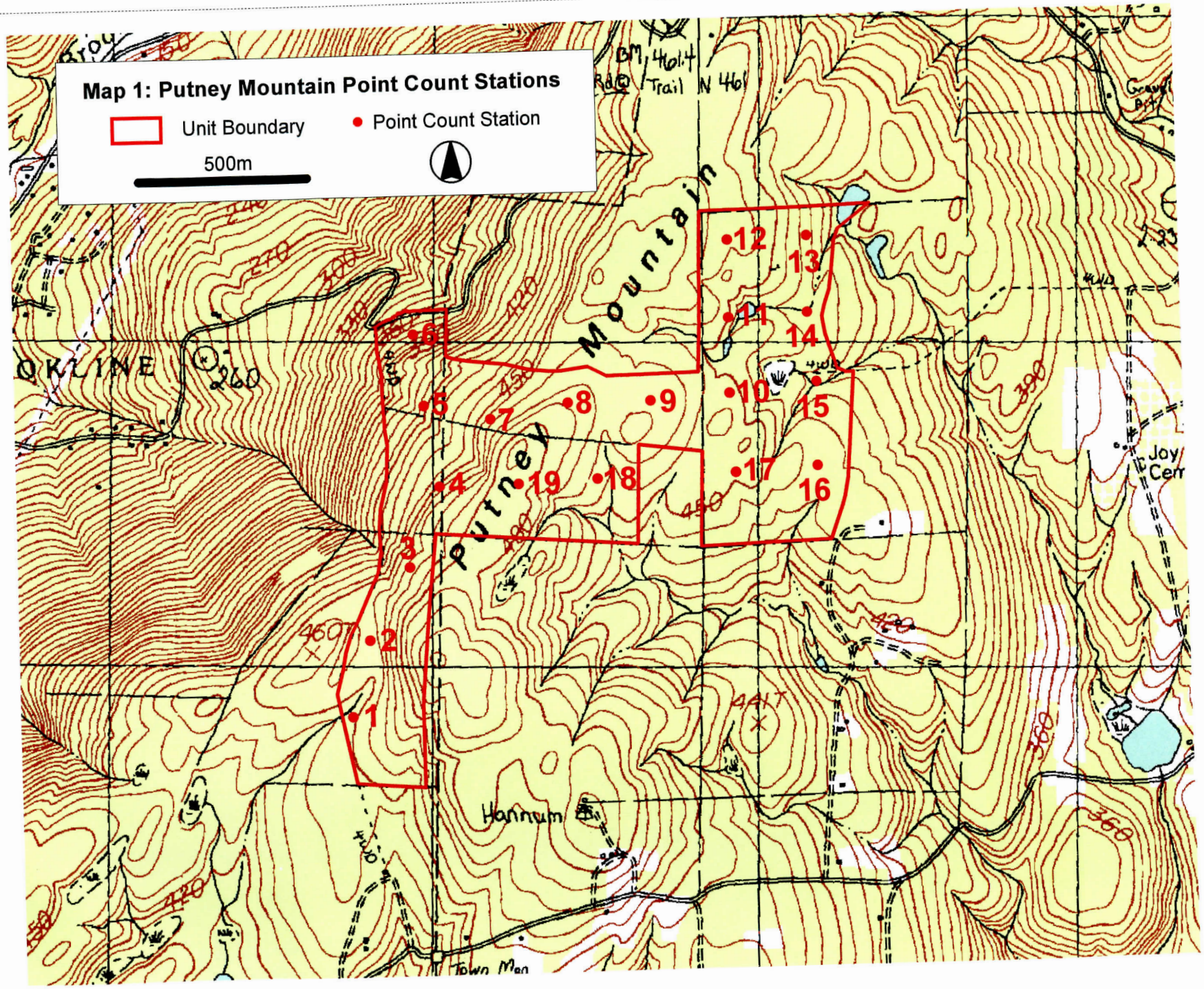
SITE DESCRIPTION AND SURVEY METHODS

The Putney Mountain Unit lies on the border between Brookline and Putney, Vermont (42°59'N, 72°36'W). The parcel's 113 hectares are dominated by mature upland stands of hardwood, softwood, and mixed composition. The common hardwood species are: sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), white birch (*Betula papyrifera*), red maple (*Acer rubrum*) and red oak (*Quercus rubra*). Eastern hemlock (*Tsuga canadensis*) and white pine *(Pinus strobus*) are the principal softwood trees.

The property's forest cover is nearly complete, with scattered canopy gaps occurring over small wetlands and along trails. The undergrowth is heterogeneous in composition, dispersion, and structure. The parcel is bordered on the west side by a jeep trail and at the northwest corner by a narrow, dirt road that is rarely traveled. Otherwise, the surrounding area is primarily forested with sparse human settlement.

We established nineteen survey stations in a grid pattern, with 250 m separating each point (Map 1). Two visits were made during the 2001 breeding season, on 8 and 19 June. During both visits, ten-minute point counts were conducted at every station, with all counts occurring between 0430 and 1040 EST. At each point, all birds seen or heard were recorded in one of three time periods (0-3, 3-5, or 5-10 min) as either within or beyond a 50-m distance.

We calculated frequency of occurrence and relative abundance for each species detected at the site. For both measures, the entire ten-minute period was used. Unless otherwise stated, values are based on detections at all distances. Frequency of occurrence (the number of points at which a species was detected divided by the number of points sampled) was calculated for each of the


Map 1: Putney Mountain Point Count Stations
Unit Boundary
Point Count Station
500m
Putney Mountain
OKLINE
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two dates, and for the survey as a whole. In the latter case, a species was considered present at a point if it was recorded on either of the two visits. To measure relative abundance, we first determined the number of individuals detected per point for each visit and then averaged the two results. We performed this calculation separately for 50-m and unlimited distance categories. In addition, occurrence frequency and relative abundance values were calculated for each of three forest types (coniferous, deciduous, mixed), using the 50-m sampling radius only. The U.S. Fish and Wildlife Service protocol calls for calculation of a minimum sample size to achieve adequate power in trend estimation. However, the software required to perform this analysis (CENSUS) was not available.

Results and Discussion

Frequency of Occurrence

In 2001, 36 species were recorded during at least one point count over the two surveys (Table 1), including three species not detected in 2000 (Barred Owl, Pileated Woodpecker, Black and White Warbler). Two more new species, Broad-winged hawk and White-throated Sparrow, were detected between point counts, and one new species (American Black Duck) was seen during a May 8 trip to the site. Eleven of the 36 species were recorded on no more than one point per visit (frequency of 0.05 in Table 1) and can be considered rare at the site. Five species recorded during last year's survey and classified as rare were not detected at all this year. This group includes Ruffed Grouse, Eastern Phoebe, Swainson's Thrush, Song Sparrow, and Swamp Sparrow. All are characteristic of habitats that are not well represented at the Putney Mountain Unit.

Hunt and Lambert (2000) expected three species to be more common: Golden-crowned Kinglet, Purple Finch, and Wood Thrush. In 2001, Golden-crowned Kinglets were abundant at the site on May 8, during the peak of kinglet migration in Vermont (Laughlin and Kibbe 1985). However, during the survey, itself, the species was found at only one station, in the same dense hemlock stand where it was observed in 2000. Dense hemlock, spruce and fir stands are favored breeding habitat for Golden-crowned Kinglets (Kaufman 1996). The predominance of white pine in the Unit's other conifer stands may diminish their value to this species.

Purple Finch and Wood Thrush showed slight increases in frequency of occurrence and relative abundance in 2001, though each remained uncommon. Future monitoring will reveal whether their numbers at the Putney Mountain Unit will follow trends observed at larger geographic scales. Breeding Bird Survey data show Wood Thrush in a 5% annual decline across northern New England since 1992 ($p=0.006$), while Purple Finch has experienced a 4% annual increase ($p=0.04$) over the same period (Sauer et al. 2001).

Table 1. Summary data for 2001 landbird point counts at the Putney Mountain Unit.

Species	Scientific Name	Frequency (n = 19)			Relative Abundance within 50 m		Relative Abundance all distances	
		8-Jun	19-Jun	overall	mean	var	mean	var
American Crow	*Corvus brachyrhynchos*	0.11	0.05	0.16	0.03	0.01	0.08	0.04
American Redstart	*Setophaga ruticilla*	0	0.05	0.05	0.03	0.01	0.03	0.01
American Robin	*Turdus migratorius*	0.53	0.32	0.68	0.37	0.19	0.6	0.38
Barred Owl	*Stix varia*	0.05	0	0.05	0.03	0.01	0.03	0.01
Black and White Warbler	*Mniotilta varia*	0.05	0.05	0.11	0.05	0.02	0.05	0.02
Blackburnian Warbler	*Dendroica fusca*	0.32	0.26	0.42	0.32	0.31	0.39	0.29
Black-capped Chickadee	*Poecile atricapillus*	0.47	0.16	0.47	0.53	0.65	0.55	0.64
Black-throated Blue Warbler	*Dendroica caerulescens*	0.11	0.16	0.26	0.03	0.01	0.11	0.04
Black-throated Green Warbler	*Dendroica virens*	0.32	0.37	0.53	0.24	0.12	0.53	0.54
Blue Jay	*Cyanocitta cristata*	0.32	0.53	0.53	0.13	0.08	0.58	0.45
Blue-headed Vireo	*Vireo solitarius*	0.05	0.16	0.21	0.11	0.04	0.11	0.04
Brown Creeper	*Certhia americana*	0.47	0.26	0.58	0.21	0.09	0.39	0.18
Brown-headed Cowbird	*Molothrus ater*	0	0.05	0.05	0	0	0.03	0.01
Cedar Waxwing	*Bombycilla cedorum*	0	0.05	0.05	0	0	0.03	0.01
Common Yellowthroat	*Geothlypis trichas*	0.26	0.16	0.32	0.13	0.08	0.29	0.23
Dark-eyed Junco	*Junco hyemalis*	0.32	0.26	0.47	0.11	0.04	0.34	0.2
Eastern Wood-Pewee	*Contopus virens*	0.16	0.26	0.37	0.03	0.01	0.18	0.09
Golden-crowned Kinglet	*Regulus satrapa*	0.05	0.05	0.05	0.05	0.05	0.08	0.12
Hairy Woodpecker	*Picoides villosus*	0.11	0.21	0.32	0.13	0.08	0.18	0.09
Hermit Thrush	*Catharus guttatus*	0.53	0.58	0.84	0.21	0.12	0.71	0.31
Mourning Dove	*Zenaida macroura*	0.05	0.05	0.11	0	0	0.05	0.02
Ovenbird	*Seiurus aurocapillus*	0.89	0.89	1	0.68	0.34	1.63	0.3
Pileated Woodpecker	*Dryocopus pileatus*	0.05	0	0.05	0	0	0.03	0.01
Purple Finch	*Carpodacus purpureus*	0.05	0.11	0.16	0.03	0.01	0.08	0.04
Red-breasted Nuthatch	*Sitta canadensis*	0.05	0.11	0.16	0.08	0.06	0.11	0.07
Red-eyed Vireo	*Vireo olivaceus*	0.89	0.68	0.95	0.34	0.14	1.08	0.42
Red-winged Blackbird	*Agelaius phoeniceus*	0	0.05	0.05	0	0	0.03	0.01
Rose-breasted Grosbeak	*Pheucticus ludivicianus*	0.21	0.26	0.37	0.08	0.04	0.24	0.12
Scarlet Tanager	*Piranga olivacea*	0.32	0.26	0.53	0	0	0.32	0.12
Tufted Titmouse	*Baeolophus bicolor*	0	0.05	0.05	0	0	0.03	0.01
Veery	*Catharus fuscescens*	0.21	0.11	0.21	0.03	0.01	0.32	0.73
White-breasted Nuthatch	*Sitta carolinensis*	0.11	0.11	0.21	0.08	0.04	0.11	0.04
Winter Wren	*Troglodytes troglodytes*	0.16	0.05	0.16	0.08	0.04	0.11	0.07
Wood Thrush	*Hylocichla mustelina*	0.05	0.05	0.11	0	0	0.05	0.02
Yellow-bellied Sapsucker	*Sphyrapicus varius*	0.42	0.26	0.63	0.23	0.07	0.34	0.08
Yellow-rumped Warbler	*Dendroica coronata*	0.58	0.32	0.68	0.39	0.35	0.71	0.54

Four species (American Crow, White-breasted Nuthatch, Red-breasted Nuthatch, Purple Finch) occurred at no more than two points on a single visit. Last year this category also included birds detected on "only one of the two visits". We eliminated the latter provision in 2001 to avoid understating the significance of species that vocalize inconsistently. For instance, Dark-eyed Junco was placed in this category last year after the species was found at four points on June 5 but went undetected on June 16. This year, Dark-eyed Juncos were detected at six points on June 8 and at five points on June 19.

Five species (Hairy Woodpecker, Winter Wren, Veery, Blue- Headed Vireo, Black-throated Blue Warbler) were found at three or four points on at least one visit. While the first three species occurred at similar levels in 2000, overall frequency measures dropped sharply for Blue-headed Vireo (0.37 to 0.21) and Black-throated Blue Warbler (053 to 0.16) in 2001.

The remaining 16 species were found at five or more points on at least one visit and are well distributed across the unit. Like last year, the Ovenbird was detected at every point at least once and Red-eyed Vireo ran a close second (found at 18 points compared to 17 last year). Hermit Thrush was the third most frequently encountered species this season showing a large increase from only eight points in 2000 to 16 points in 2001.

Relative Abundance

Discussion of relative abundance will be limited to the most common species. Within the 50-m circles Ovenbird and Black-capped Chickadee averaged 0.5 or more individuals per point. American Robin, Red-eyed Vireo, Yellow-rumped Warbler and Blackburnian Warbler averaged between 0.3 and 0.49 individuals per point. They were followed by Black-throated Green Warbler, Yellow-bellied Sapsucker, Hermit Thrush, and Brown Creeper at 0.2 to 0.29 individuals per point. The list of the 15 most abundant birds in 2001 is completed by five that averaged between 0.1 and 0.19 individuals per point. These were: Blue-headed Vireo, Dark-eyed Junco, Hairy Woodpecker, Common Yellowthroat, and Blue Jay.

Four additional species were rarely, if ever, detected within 50 m, but were counted in relatively high numbers beyond 50 m in 2001: Eastern Wood Peewee, Veery, Scarlet Tanager, and Rose-breasted Grosbeak. When the 50-m data are averaged for 2000 and 2001, the first three of these four birds replace Blue-headed Vireo, Hairy Woodpecker, and Common Yellowthroat on the list of 15 most abundant species (Table 2). This list bears a close resemblance to those generated by other mature forest surveys conducted in Maine mixed woods (Hagan et al. 1997), New Hampshire northern hardwoods (Holmes et al. 1986), and Vermont northern hardwoods (Lent and Capen 1995). Four of the Putney Unit's most common species, including Ovenbird and Red-eyed Vireo, were among the most abundant species in each of the three other studies. Thirteen of the 15 most common species appear on at least one of the other lists. The two species unique to the Putney Unit list are American Robin and Eastern Wood Peewee.

Table 2. The fifteen most common bird species at four northern New England study sites, listed in descending order of abundance.

Putney Mountain, VT 2000-2001	Hubbard Brook, NH 1981-1982
Hunt, Lousada and Lambert	Holmes et al. 1986 - northern hardwoods
Ovenbird	American Redstart
Red-eyed Vireo	Red-eyed Vireo
American Robin	Black-throated Blue Warbler
Yellow-rumped Warbler	Ovenbird
Black-capped Chickadee	Black-throated green Warbler
Hermit Thrush	Rose-breasted Grosbeak
Blackburnian Warbler	Scarlet Tanager
Black-throated Green Warbler	Blackburnian Warbler
Blue Jay	Veery
Yellow-bellied Sapsucker	White-breasted Nuthatch
Brown Creeper	Hairy Woodpecker
Scarlet Tanager	Yellow-bellied Sapsucker
Veery	Philadelphia Vireo
Dark-eyed Junco	Swainson's Thrush
Eastern Wood Peewee	Wood Thrush

North-central Maine 1992-1993	Grafton, VT 1981
Hagan et al. 1997 - mature mixed wood	Lent and Capen 1995 - northern hardwood
Blackburnian Warbler	Red-eyed Vireo
Red-eyed Vireo	Ovenbird
Black Throated Blue warbler	Blue Jay
Golden-crowned Kinglet	Black- capped Chickadee
Yellow-rumped Warbler	Veery
Black-throated Green Warbler	Black-throated Blue Warbler
Ovenbird	Black-throated Green Warbler
Magnolia Warbler	Rose-breasted Grosbeak
Black-capped Chickadee	Black and White Warbler
Red-breasted Nuthatch	Dark-eyed Junco
Northern Parula	Scarlet Tanager
Solitary Vireo	Hermit Thrush
Winter Wren	Yellow-bellied Sapsucker
Swainson's Thrush	Wood Thrush
Yellow-bellied Sapsucker	Brown Creeper

Habitat Associations

The Putney Mountain Unit features a mosaic of deciduous, coniferous, and mixed forest cover. The interspersion of these forest types complicates efforts to quantify habitat relationships. However, by classifying the canopy within the limited sampling radius (50 m) and using data from that circle only, we can develop a species list for each cover type (Appendix 1). Table 3 lists species that were detected in relatively high numbers ($\geq$ 0.25 individuals per point) within each forest type.

Table 3. Bird species associated with each of three forest cover types at the Putney Mountain Unit based on 2001 data. Measures of relative abundance (average number of individuals per point) appear in parentheses.

Coniferous	Deciduous	Mixed
Ovenbird (1.08)	Black-capped Chickadee (0.83)	Ovenbird (0.43)
Blackburnian Warbler (0.67)	Red-eyed Vireo (0.67)	American Robin (0.36)
Yellow-rumped Warbler (0.67)	Ovenbird (0.58)	Brown Creeper (0.36)
Black- capped Chickadee (0.58)	Black-throated Green Warbler (0.42)	Red-eyed Vireo (0.29)
American Robin (0.42)	Yellow-rumped Warbler (0.33)	Yellow-bellied Sapsucker (0.29)
Blue Jay (0.33)	American Robin (0.33)	Common Yellowthroat (0.29)
	Hermit Thrush (0.25)	
	White-breasted Nuthatch (0.25)	
	Yellow-bellied Sapsucker (0.25)	

These results demonstrate several well-known habitat associations that have been described for New England songbirds by DeGraaf and Rudis (1986). Specialists are represented by Blackburnian Warbler (coniferous) and White-breasted Nuthatch (deciduous). American Robins and Ovenbirds exhibit a generalized habitat pattern, occurring in high numbers within all three types. Yellow-bellied Sapsuckers and Red-eyed Vireos show a characteristically strong association with deciduous and mixed forests, and a predictably weak association with forests dominated by conifer trees. The sensitivity of this analytical approach is somewhat limited, however, as revealed by the Yellow-rumped Warbler. This softwood associate was most abundant in conifer stands, but was also common at points designated as deciduous; it occurred at lowest density in mixed forests. Such incongruity is inevitable in areas of fine-grained habitat patchiness, where the likelihood of detecting a bird outside of its primary habitat is pronounced.

Population Change

Compared to last year, five species showed > 50% change in relative abundance values in the unlimited distance class: Dark-eyed Junco (+162%), Veery (+100%), Hermit Thrush (+69%),

Black-throated Blue Warbler (-62%), and Blue-headed Vireo (-54%). The magnitude of the Dark-eyed Junco increase may be exaggerated as an effect of irregular vocal activity in 2000. Because the frequency and relative abundance data for the four other species show within-year consistency, they are more likely to reflect an actual change in numbers at the site. In order to detect population trends, however, three more years of data are required to reach the minimum 5-year survey period recommended by the U.S. Fish and Wildlife Service (Pence 1996).

CONCLUSIONS

The Partners in Flight (PIF) Land Conservation Plan for the northern New England physiographic area lists priority species for northern hardwood and mixed forests and emphasizes the importance of these habitat types because of the number of associated bird species with high priority scores (Hodgman and Rosenberg 2000). The priority list of 16 species includes nine that have been detected at Putney Mountain: Wood Thrush, Black-throated Blue Warbler, Blackburnian Warbler, Scarlet Tanager, Rose-breasted Grosbeak, Eastern Wood Peewee, Veery, Purple Finch, and Ovenbird. From this list, Blackburnian Warbler and Eastern Wood Peewee warrant special management attention as the only two species that are both locally abundant and in pronounced, long-term decline in the PIF focus area (Hodgman and Rosenberg 2000).

In Maine industrial forests, Blackburnian Warblers are linked to conifer, reaching their highest numbers in mature mixed woods and in mixed woods that have experienced recent selection harvests (Hagan et al. 1997, Hagan and Grove 1999). The Unit's small canopy gaps, associated with trails, wetlands, bordering roads, and scattered clearings, may benefit both Blackburnian Warblers and Eastern Wood Peewees. In a comparison of Vermont landscapes with no canopy disturbance and 10% canopy disturbance, Buford and Capen (1999) found significantly more Blackburnian Warblers in the lightly disturbed landscapes. For their part, Eastern Wood Peewees are associated with a variety of forest types that feature edges or openings (DeGraaf and Rudis 1986). While maintenance of existing openings would appear to support both species, an increase in their extent may reduce habitat suitability for forest-dependent songbirds such as Ovenbird, Scarlet Tanager, and Black-throated Blue Warbler.

Conserving the full suite of PIF priority species will require a management plan that recognizes the trade-offs of canopy disturbance. We recommend that the U.S. Fish and Wildlife Service utilize the Unit's created and inherent openings to achieve bird conservation objectives and restrict further tree removal until monitoring results compel an alternative management strategy.

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Appendix 1. The relative abundance of landbirds at the Putney Mountain Unit tabulated by forest cover type, based on 2001 data.

Conifer Forest (6 stations)

Species	Relative Abundance within 50 m	
	mean	var
Ovenbird	1.08	0.64
Blackburnian Warbler	0.67	0.67
Yellow-rumped Warbler	0.67	0.67
Black-capped Chickadee	0.58	0.54
American Robin	0.42	0.14
Blue Jay	0.33	0.17
Dark-eyed Junco	0.17	0.07
Hairy Woodpecker	0.17	0.17
Hermit Thrush	0.17	0.17
Red-breasted Nuthatch	0.17	0.17
Yellow-bellied Sapsucker	0.17	0.07
American Crow	0.08	0.04
Black and white Warbler	0.08	0.04
Black-throated Blue Warbler	0.08	0.04
Black-throated Green Warbler	0.08	0.04
Brown Creeper	0.08	0.04
Red-eyed Vireo	0.08	0.04
Winter Wren	0.08	0.04

Deciduous Forest (6 stations)

Species	Relative Abundance within 50 m	
	mean	var
Black-capped Chickadee	0.83	1.37
Red-eyed Vireo	0.67	0.07
Ovenbird	0.58	0.14
Black-throated Green Warbler	0.42	0.14
American Robin	0.33	0.17
Yellow-rumped Warbler	0.33	0.27
Hermit Thrush	0.25	0.08
White-breasted Nuthatch	0.25	0.08
Yellow-bellied Sapsucker	0.25	0.08
Blackburnian Warbler	0.17	0.17
Blue-headed Vireo	0.17	0.07
Brown Creeper	0.17	0.07
American Redstart	0.08	0.04
Barred Owl	0.08	0.04
Blue Jay	0.08	0.04
Common Yellowthroat	0.08	0.04
Dark-eyed Junco	0.08	0.04
Eastern Wood-Pewee	0.08	0.04
Hairy Woodpecker	0.08	0.04
Red-breasted Nuthatch	0.08	0.04
Rose-breasted Grosbeak	0.08	0.04
Veery	0.08	0.04
Winter Wren	0.08	0.04

Mixed Forest (7 stations)

Species	Relative Abundance within 50 m	
	mean	var
Ovenbird	0.43	0.12
American Robin	0.36	0.31
Brown Creeper	0.36	0.14
Common Yellowthroat	0.29	0.15
Red-eyed Vireo	0.29	0.15
Yellow-bellied Sapsucker	0.29	0.07
Black-capped Chickadee	0.21	0.15
Black-throated Green Warbler	0.21	0.15
Hermit Thrush	0.21	0.15
Yellow-rumped Warbler	0.21	0.15
Blackburnian Warbler	0.14	0.06
Blue-headed Vireo	0.14	0.06
Golden-crowned Kinglet	0.14	0.14
Hairy Woodpecker	0.14	0.06
Rose-breasted Grosbeak	0.14	0.06
Black and white Warbler	0.07	0.04
Dark-eyed Junco	0.07	0.04
Purple Finch	0.07	0.04
Winter Wren	0.07	0.04

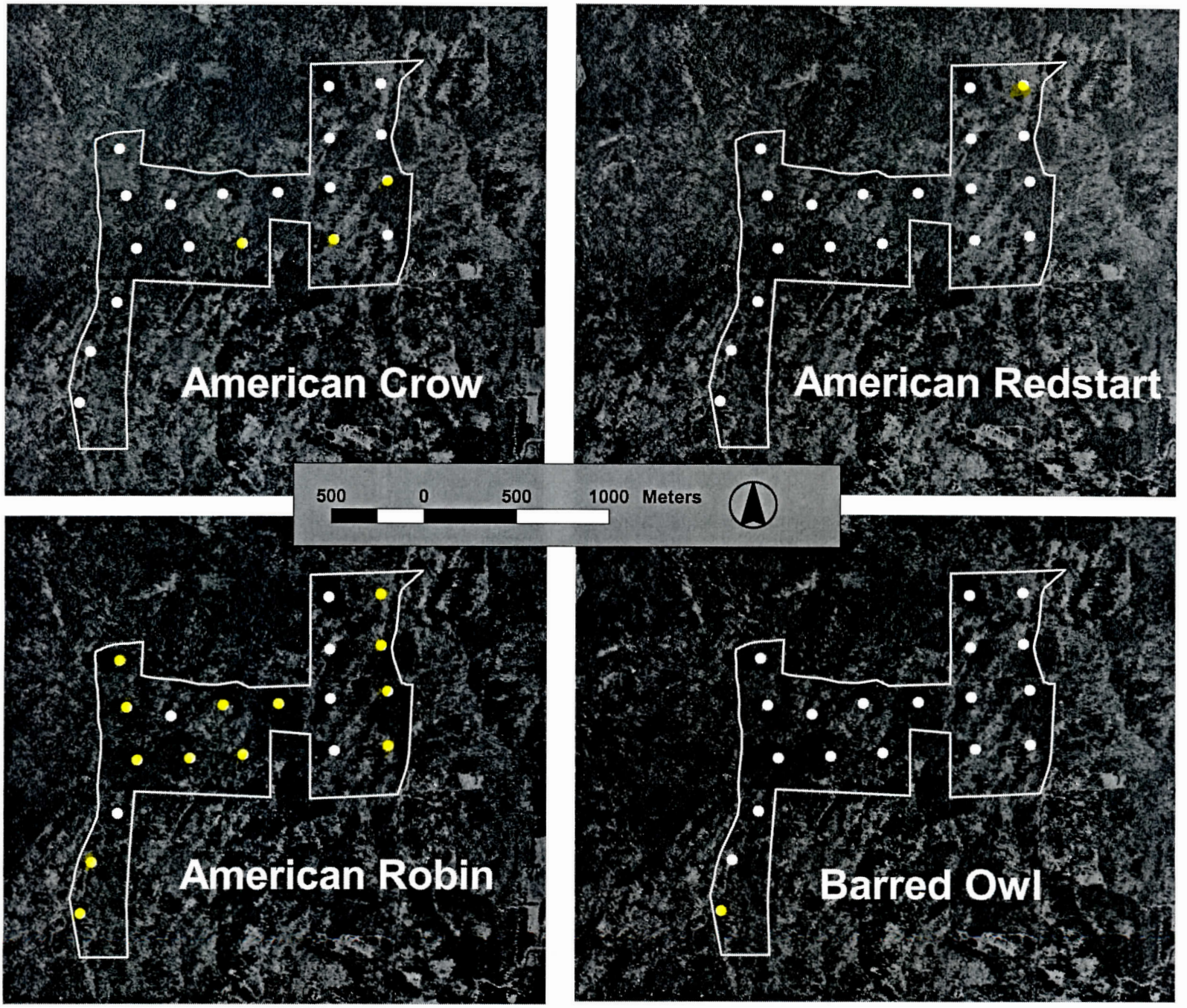
Appendix 2. Birds observed at the Putney Mountain Unit in 2000 and 2001, listed in taxonomic

Common Name	Scientific Name
American Black Duck	*Anas rubripes*
Broad-winged Hawk	*Buteo platypterus*
Red-tailed Hawk	*Buteo jamaicensis*
Ruffed Grouse	*Bonasa umbellus*
Wild Turkey	*Meleagris gallopavo*
American Woodcock	*Scolopax minor*
Mourning Dove	*Zenaida macroura*
Barred Owl	*Strix varia*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
Eastern Wood-Pewee	*Contopus virens*
Eastern Phoebe	*Sayornis phoebe*
Tree Swallow	*Tachycineta bicolor*
Blue-headed Vireo	*Vireo solitarius*
Red-eyed Vireo	*Vireo olivaceus*
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Black-capped Chickadee	*Poecile atricapillus*
Tufted Titmouse	*Baeolophus bicolor*
White-breasted Nuthatch	*Sitta carolinensis*
Red-breasted Nuthatch	*Sitta canadensis*
Brown Creeper	*Certhia americana*
Winter Wren	*Troglodytes troglodytes*
Golden-crowned Kinglet	*Regulus satrapa*
Veery	*Catharus fuscescens*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
Wood Thrush	*Hylocichla mustelina*
American Robin	*Turdus migratorius*
Cedar Waxwing	*Bombycilla cedorum*
Chestnut-sided Warbler	*Dendroica pensylvanica*
Black-throated Blue Warbler	*Dendroica caerulescens*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Green Warbler	*Dendroica virens*
Blackburnian Warbler	*Dendroica fusca*
Black and White Warbler	*Mniotilta varia*
American Redstart	*Setophaga ruticilla*
Ovenbird	*Seiurus aurocapillus*
Common Yellowthroat	*Geothlypis trichas*
Scarlet Tanager	*Piranga olivacea*
Song Sparrow	*Melospiza melodia*
Swamp Sparrow	*Melospiza georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
Dark-eyed Junco	*Junco hyemalis*
Rose-breasted Grosbeak	*Pheucticus ludivicianus*
Red-winted Blackbird	*Agelaius phoeniceus*
Brown-headed Cowbird	*Molothrus ater*
Purple Finch	*Carpodacus purpureus*
American Goldfinch	*Carduelis tristis*

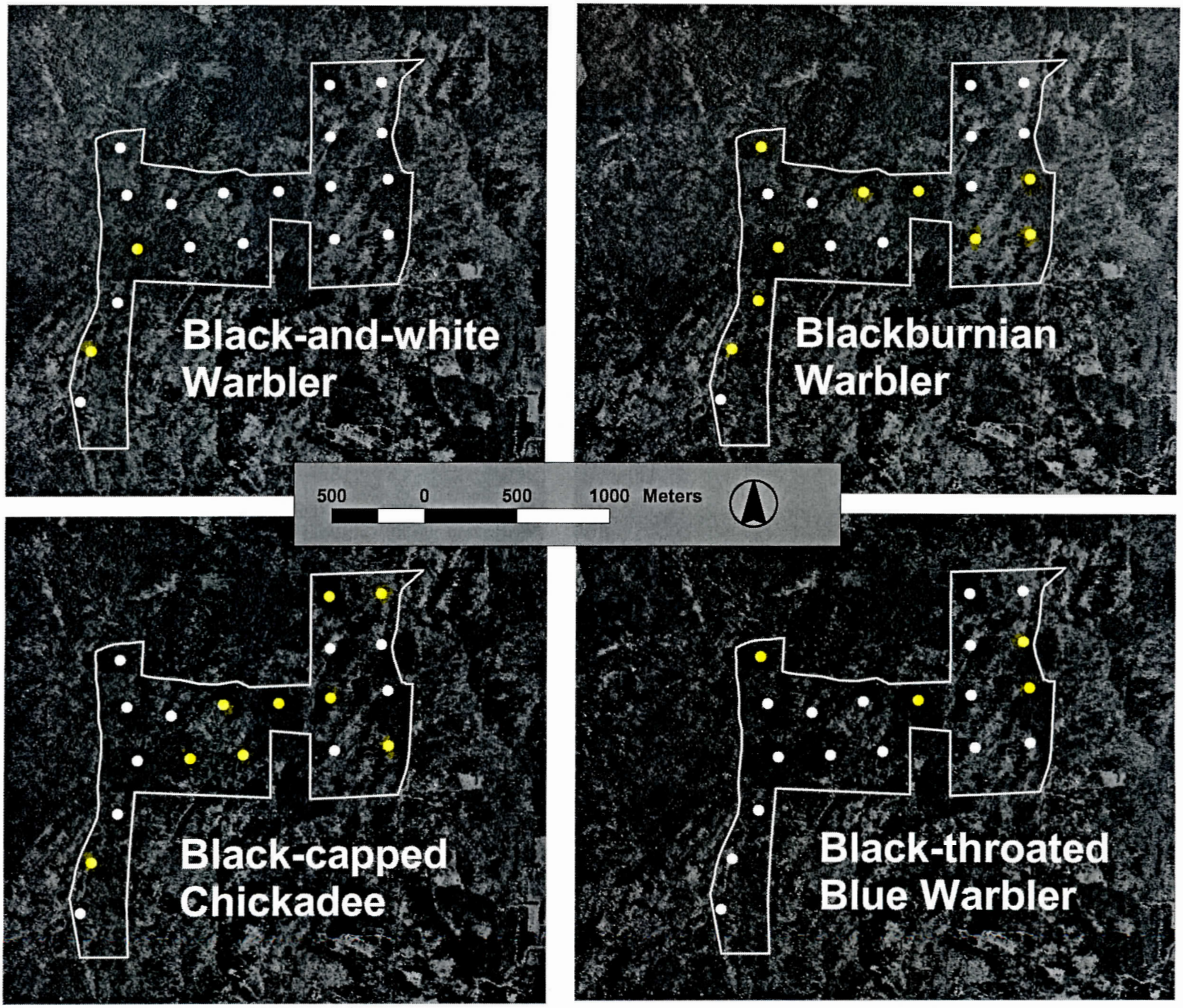
Appendix 3. Landbird survey point locations and associated forest types at the Putney Mountain Unit of the Silvio O. Conte National Fish and Wildlife Refuge. Coordinates are expressed in meters based on North American Datum 1927.

Point	East	North	Forest Type
PUT001	694790	4760850	Deciduous
PUT002	694842	4761087	Mixed
PUT003	694963	4761313	Mixed
PUT004	695053	4761562	Coniferous
PUT005	695004	4761811	Mixed
PUT006	694970	4762031	Deciduous
PUT007	695210	4761770	Coniferous
PUT008	695450	4761821	Deciduous
PUT009	695706	4761828	Coniferous
PUT010	695950	4761853	Deciduous
PUT011	695946	4762085	Mixed
PUT012	695941	4762327	Coniferous
PUT013	696186	4762341	Deciduous
PUT014	696189	4762103	Mixed
PUT015	696218	4761888	Coniferous
PUT016	696222	4761630	Mixed
PUT017	695969	4761608	Deciduous
PUT018	695542	4761588	Mixed
PUT019	695297	4761571	Coniferous

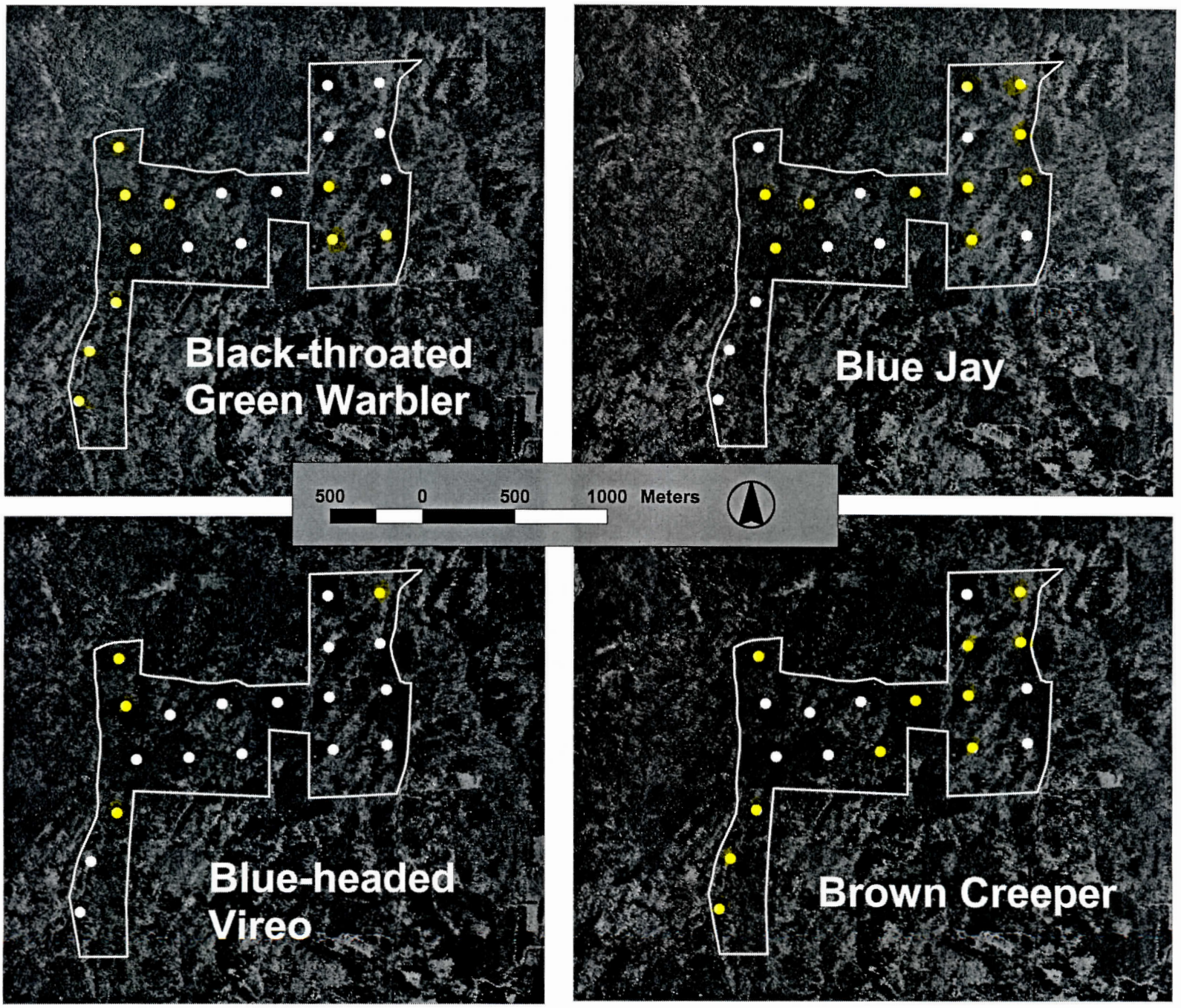
Appendix 4. Bird distribution at the Putney Mountain Unit in 2001.



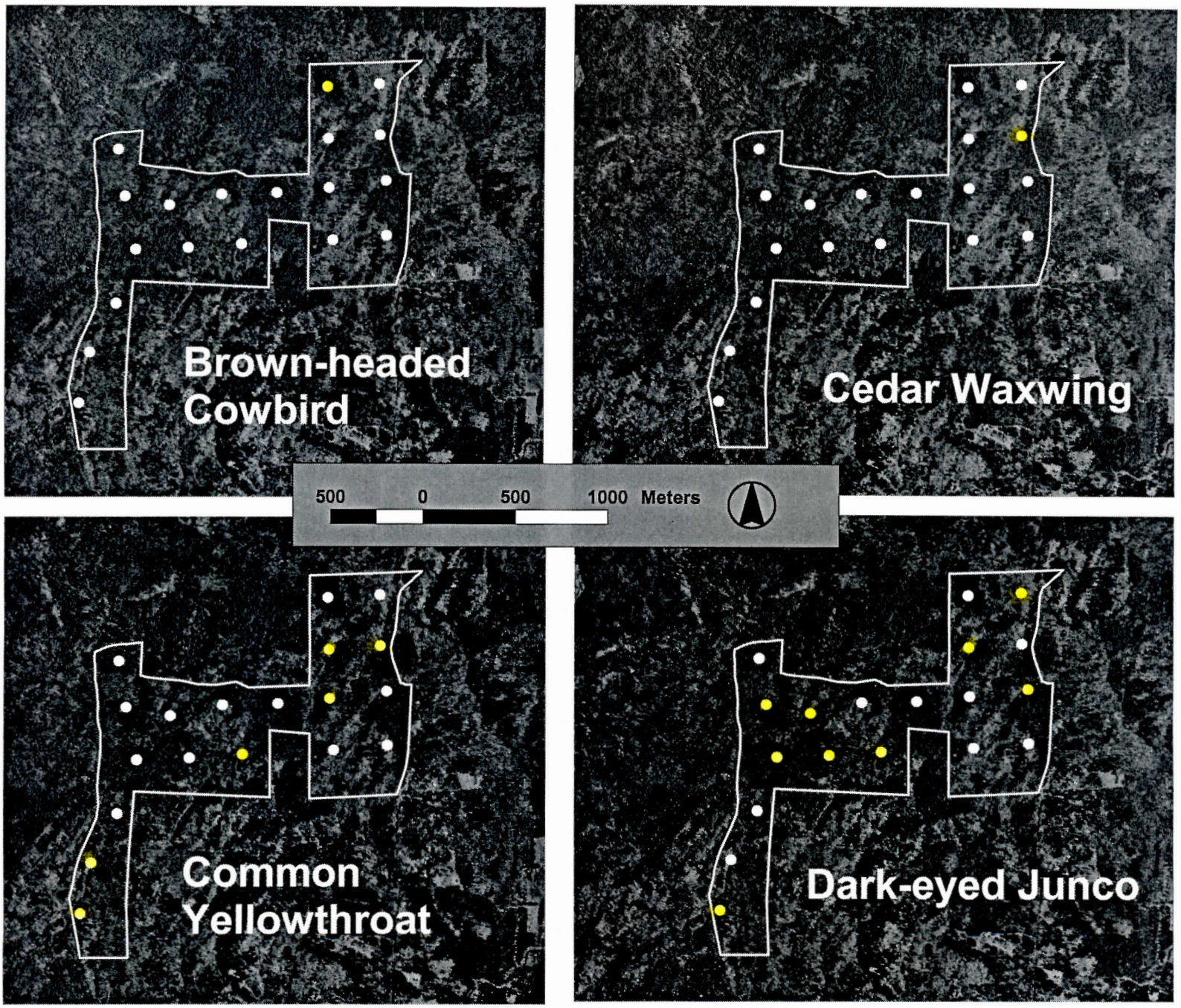
Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



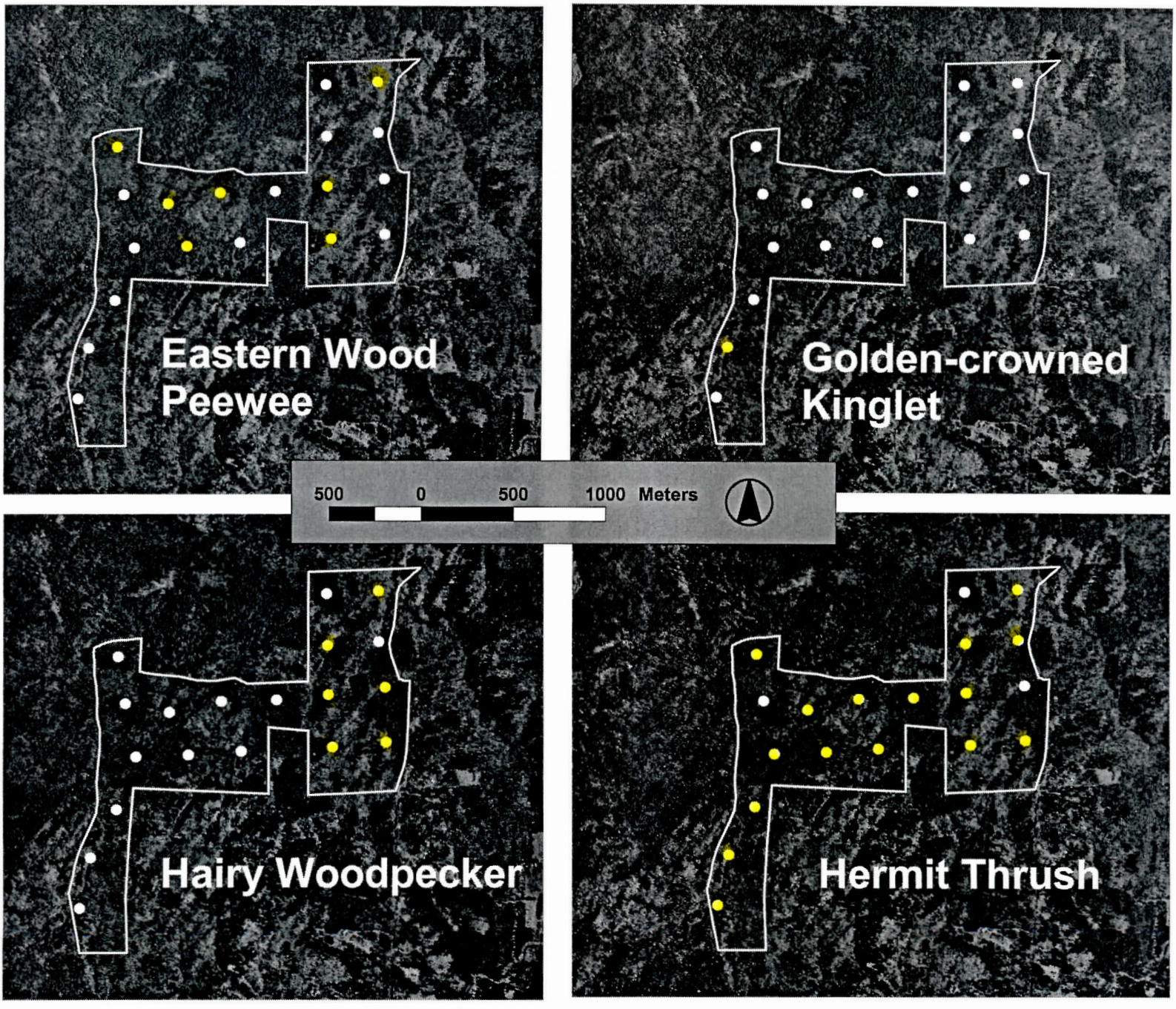
Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



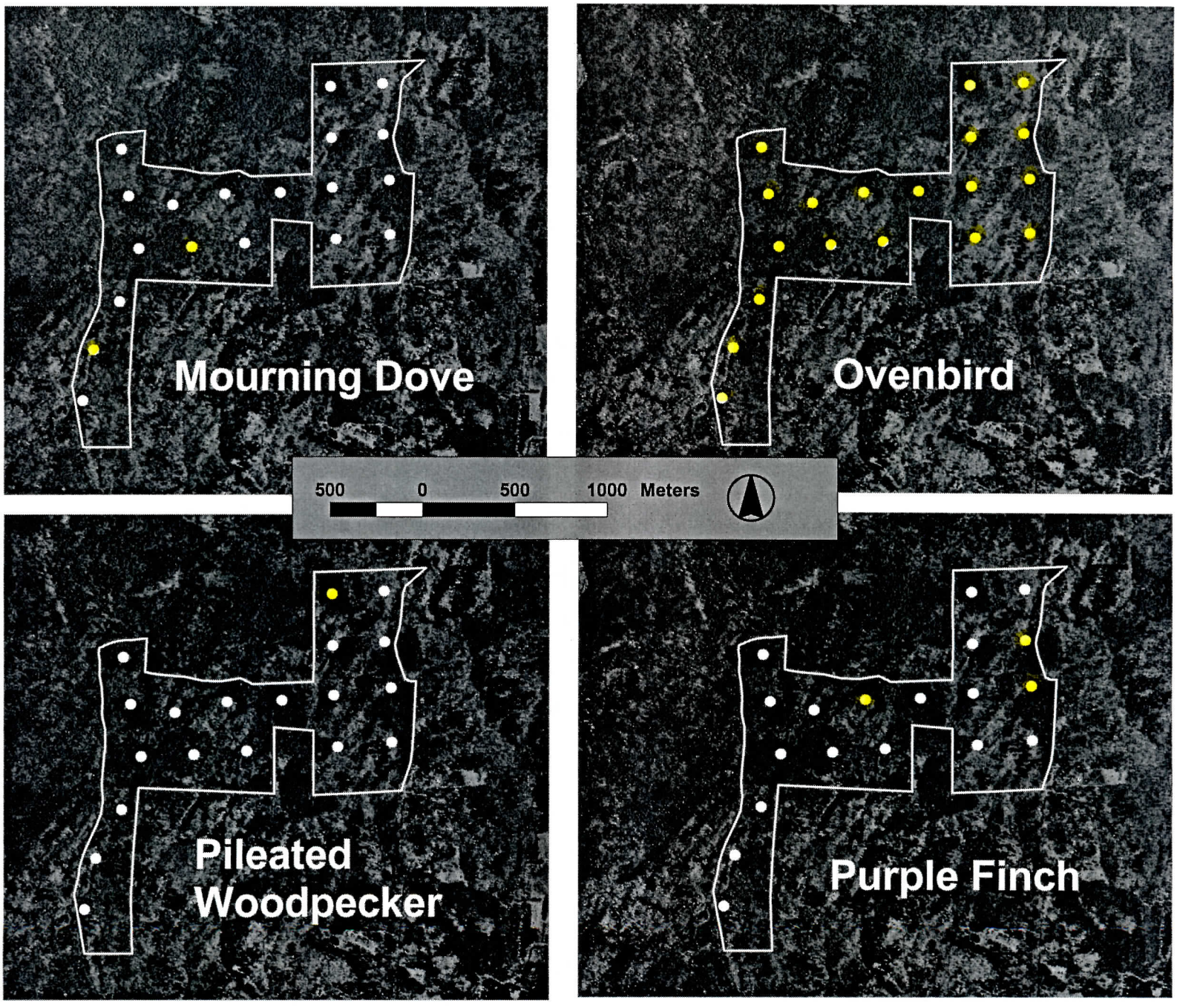
Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



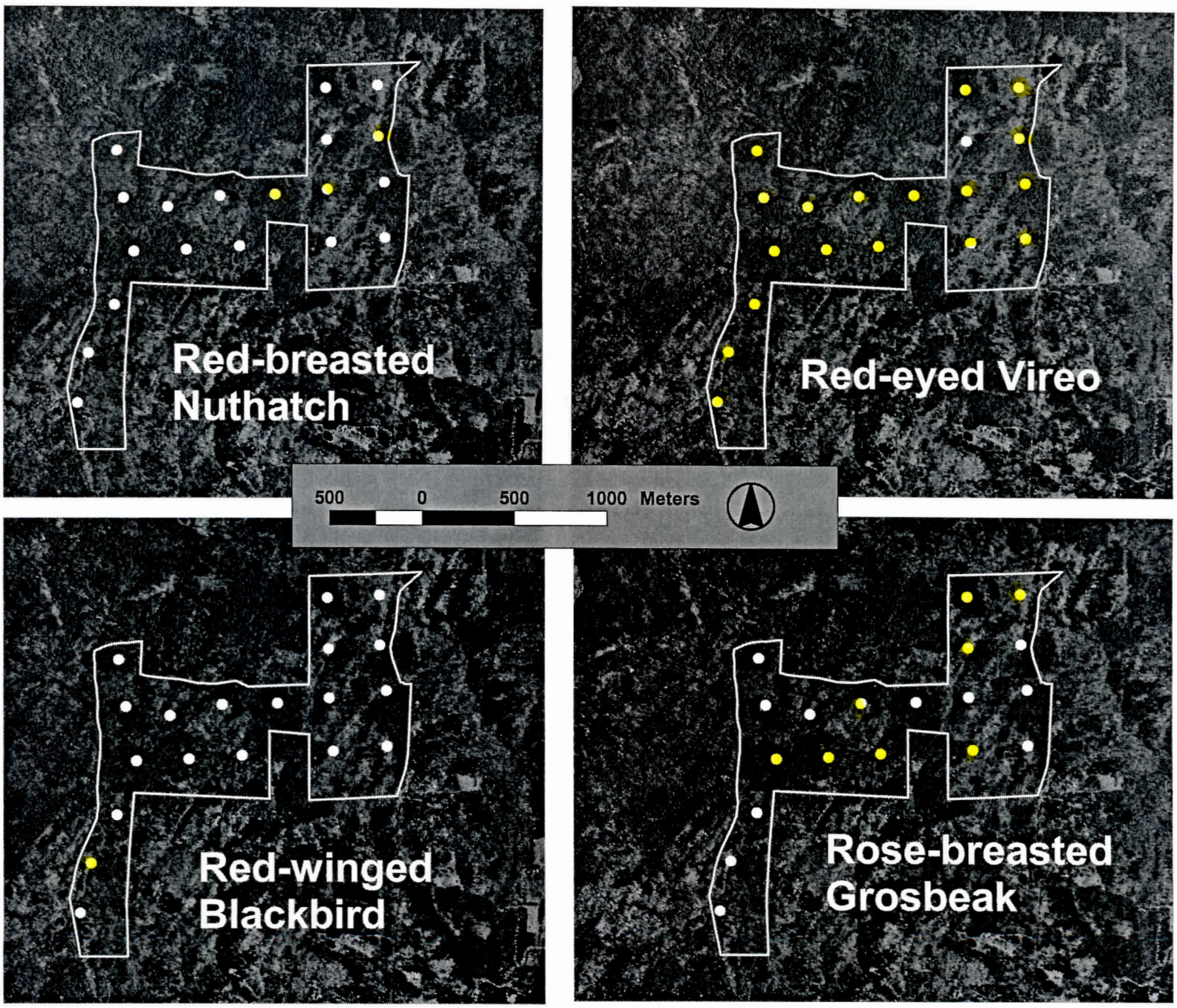
Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



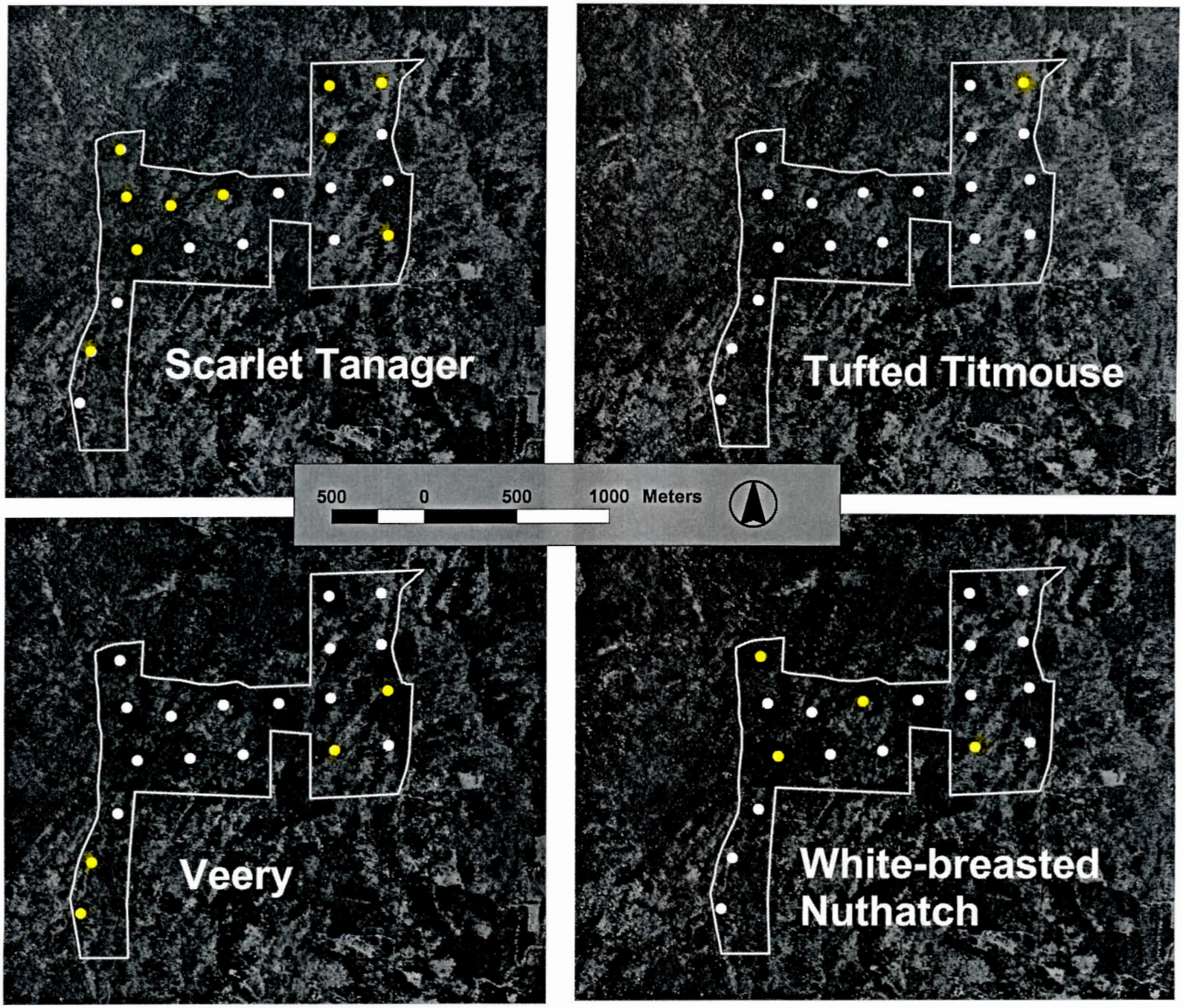
Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



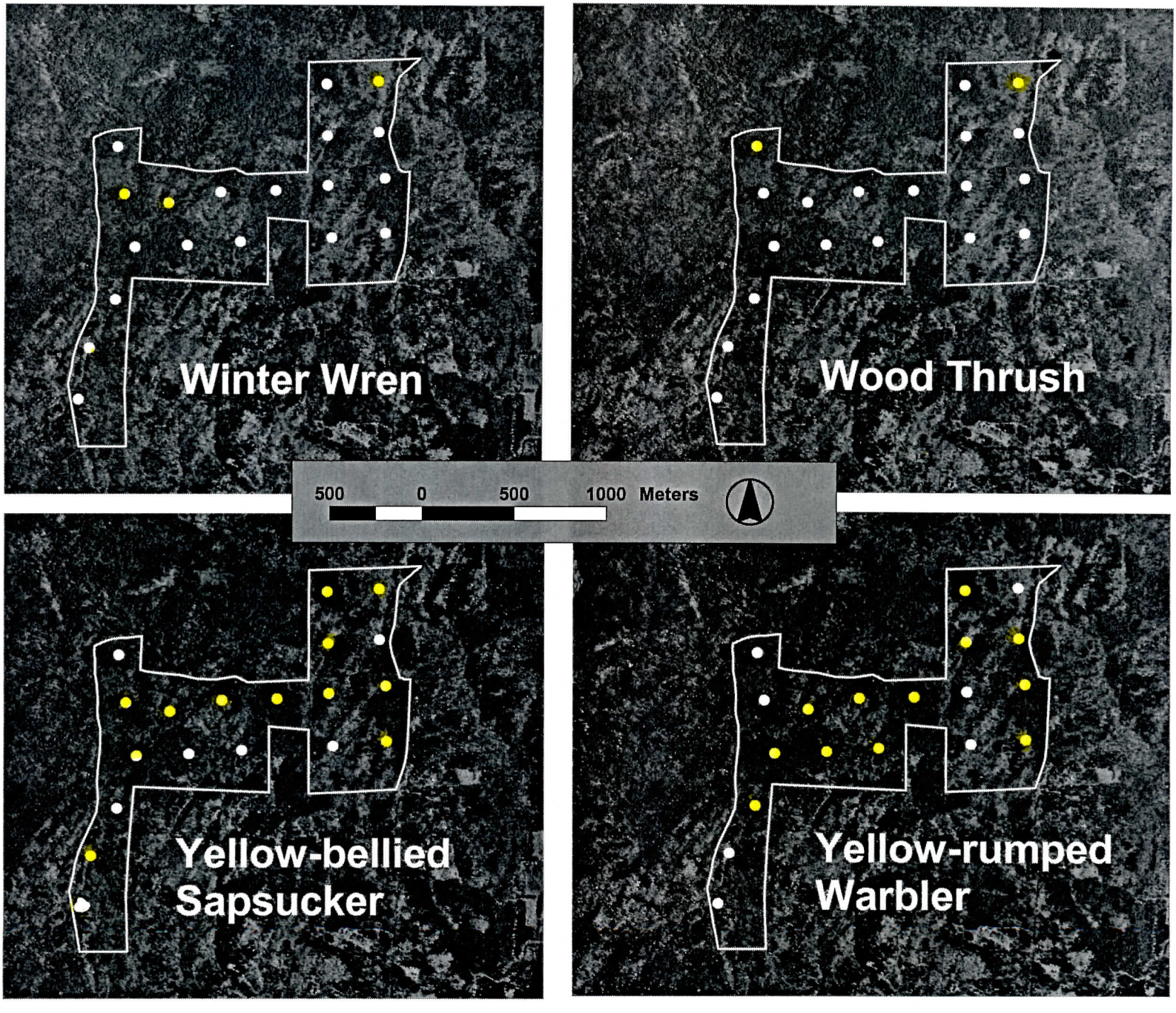
Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.



Maps show bird distribution at the Putney Mountain Unit according to June 2001 point count surveys. Highlighted dots represent listening stations from which the given species was detected.