

VEGETATION ANALYSIS AND VEGETATION MANAGEMENT CONSIDERATIONS
FOR RICHMOND NATIONAL BATTLEFIELD PARK

Prepared by

USDA Forest Service
Southern Region
Forest Pest Management
Atlanta, Georgia

February 17, 1984

CONTENTS

	Page
Summary of Vegetation Cover by Area and Stand.....	1
Watt House.....	1
Cold Harbor.....	2
Ft. Darling.....	3
Ft. Harrison.....	3
Total Volume per Stand by Area.....	6
Watt House.....	6
Cold Harbor.....	6
Ft. Darling.....	7
Ft. Harrison.....	7
Vegetation Management Considerations.....	9
A Comparison of Vegetation Control Alternatives.....	11
Appendix.....	12
Maps.....	12
Richmond National Battlefield Park.....	12
Watt House.....	13
Cold Harbor.....	14
Ft. Darling.....	15
Ft. Harrison.....	16
Graphs.....	17
Total Volume per Acre by Stand.....	17
Watt House.....	17
Cold Harbor.....	18
Ft. Darling.....	19
Ft. Harrison.....	20
Forest Cover Type by Area.....	22
Watt House.....	22
Cold Harbor.....	23
Ft. Darling.....	24
Ft. Harrison.....	25

SUMMARY OF VEGETATION COVER BY AREA AND STAND

Area	Stand	Acreage	Cover Type	Understory ^{1/}	Site Index ^{2/}	Comments
Watt House	1	8.50	Bottomland hardwood - yellow pine	Holly, greenbriar	70	Moderate fuel, wet site.
	2	1.63	Loblolly pine	Holly, sweetgum, poison ivy	80	Moderate - heavy fuel load. Large-scale SPB-caused mortality.
	3	13.99	Field	---	---	---
	4	5.31	Loblolly pine - hardwood	Holly, sweetgum, greenbriar	80	Moderate fuel; some SPB-caused mortality.
	5	9.77	Yellow poplar - white oak - northern red oak	Holly, grapevine, sawbriar, dogwood, honeysuckle	80	Moderate - heavy fuel load.
	6	21.10	Northern red oak - hickory - yellow pine	Largely park-like, some viburnum and cedar	80	Largely an open area; some SPB mortality.

^{1/} Listed in order of prevalence.

^{2/} For northern red oak.

Area	Stand	Acreage	Cover Type	Understory	Site Index	Comments
Cold Harbor	1	7.16	White oak - red oak - hickory	Viburnum, red maple, holly	70	Heavy fuel due to SPB-killed trees.
	2	8.65	White oak - red oak - hickory	Holly, yellow poplar	70	Moderate fuel load.
	3	3.72	White oak - black oak - yellow pine	Holly, hickory, dogwood	80	Low fuel.
	4	17.28	Open field	---	---	---
	5	30.99	Yellow poplar - white oak - northern red oak	Holly, dogwood, grapevine, honeysuckle	90	Low - moderate fuel, some SPB-caused mortality.
	6	36.35	Northern red oak - hickory - yellow pine	Viburnum, dogwood, cherry	80	Part of stand is park-like; some SPB mortality.
	7	44.84	White oak - red oak - hickory	Holly, viburnum	90	Low to moderate fuel from downed hardwoods.

Area	Stand	Acreage	Cover Type	Understory	Site Index	Comments
Ft. Darling	1	44.0	Yellow poplar - white oak - northern red oak	Dogwood, red maple, beech, mountain laurel	60	Steep slopes with light fuel load.
	2	8.21	Loblolly pine	Smilax, greenbriar	---	A dense, flat sapling stand.
	3	5.01	Open	---	---	---
	4	20.82	Open	---	---	---
	5	17.10	Yellow poplar - white oak - northern red oak	Dogwood, red oak, hickory	80	Steep slopes, moderate - light fuel load.
Ft. Harrison	1	15.22	White oak - black oak - yellow pine	Pine, dogwood, greenbriar	60	Light fuel load.
	2	29.23	Loblolly pine - hardwood	Red oak, sweetgum	60	Light fuel load.
	3	42.62	Loblolly pine - hardwood	Holly, sweetgum, maple	60	Medium fuel load.

Area	Stand	Acreage	Cover Type	Understory	Site Index	Comments
Ft. Harrison (con't)	4	5.49	Loblolly pine	Dogwood, cedar, honeysuckle	60	Heavy fuel load due to SPB-caused mortality.
	5	3.04	Loblolly pine	Cedar, greenbriar, pine	70	Heavy fuel load due to SPB-caused mortality.
	6	2.46	Loblolly pine	Greenbriar, red oak, maple	80	Heavy fuel load due to SPB-caused mortality.
	7	13.39	White oak - red oak - hickory	Honeysuckle, oak	60	Moderate - heavy fuel load due to SPB.
	8	27.99	White oak - black oak - yellow pine	Sweetgum, pine, dogwood	80	Moderate - heavy fuel load.
	9	37.14	Loblolly pine - hardwood	Honeysuckle, greenbriar, sweetgum	80	Heavy fuel load.
	10	16.46	Northern red oak - hickory - yellow pine	White oak, sweetgum, holly	80	Low fuel, swampy area.

Area	Stand	Acreage	Cover Type	Understory	Site Index	Comments
Ft. Harrison (con't)	11	15.25	Loblolly pine - hardwood	Honeysuckle, greenbriar	60	Heavy fuel load.
	12	17.05	Loblolly pine - hardwood	Hickory, red maple, sweetgum	60	Heavy fuel load.
	13	40.21	Yellow poplar - white oak - northern red oak	Red oak, holly	80	Low fuel load.
	14	44.45	White oak - black oak - yellow pine	Holly, sweetgum, white oak	70	Moderate - heavy fuel.

VOLUME PER STAND BY AREA (CCF)

Area	Stand	Sawtimber		Poletimber		Total
		Hardwood	Pine	Hardwood	Pine	
Watt House	1	85.85	15.47	39.78	0	141.10
	2	16.46	2.54	4.24	0	23.24
	3	0	0	0	0	0
	4	29.63	39.29	20.71	0	89.63
	5	129.96	12.70	12.70	0	155.36
	6	158.88	128.71	59.08	29.54	376.21
Total		420.78	198.71	136.51	29.54	785.54
Fort Darling	1	131.32	10.00	76.44	17.84	235.60
	2	A dense, loblolly pine sapling stand				
	3	0	0	0	0	0
	4	0	0	0	0	0
	5	57.76	4.41	41.50	31.92	135.59
Total		189.08	14.41	117.94	49.76	371.19

Area	Stand	Sawtimber		Poletimber		Total
		Hardwood	Pine	Hardwood	Pine	
Cold Harbor	1	24.13	29.71	29.79	14.03	97.66
	2	76.38	2.23	24.22	0	102.83
	3	25.59	0.97	10.42	4.69	41.67
	4	0	0	0	0	0
	5	440.01	81.81	165.18	15.50	702.50
	6	207.56	80.33	151.22	25.45	464.56
	7	127.79	25.56	169.05	9.42	331.82
Total		901.46	220.61	549.88	69.09	1741.04
Fort Harrison	1	118.56	27.70	15.37	0	161.63
	2	142.35	57.00	38.00	40.92	278.27
	3	1.28	370.88	144.09	59.68	575.93
	4	0	0	0	124.84	124.84
	5	1.30	24.87	5.14	5.96	37.27
	6	0	15.96	2.14	0	18.10
	7	79.94	2.14	62.66	0	144.74

Area	Stand	Sawtimber		Poletimber		Total
		Hardwood	Pine	Hardwood	Pine	
Fort Harrison (con't)	8	120.07	83.69	23.51	0	227.27
	9	96.56	77.25	101.39	0	275.20
	10	59.75	222.98	271.75	210.11	764.59
	11	0	6.56	51.55	100.34	158.45
	12	37.51	22.16	66.49	0	126.13
	13	94.09	313.24	324.09	0	731.42
	14	207.48	138.68	317.82	87.12	751.20
Total		958.99	1363.11	1424.00	628.97	4375.07

∞

VEGETATION MANAGEMENT CONSIDERATIONS

Four methods can be used to control vegetation in the park: mechanical, chemical, control burn, or a combination of the three. Each method offers advantages and disadvantages relative to cost, environmental effects, public relations implications, and long-term consequences. All are compared in a matrix on page 11.

Mechanical Vegetation Control. This method is probably the least controversial from a public relations perspective. Physical clearing of the land contributes no chemical pollution to either the land or air. Unfortunately, it also poses the greatest threat to earthworks, particularly if heavy equipment is used. Additionally, the cost of physically controlling vegetation is high, especially hand clearing where substantial labor costs are involved. Often, satisfactory hand mechanical clearing is difficult, because many plant species can sprout at or below the root collar. This necessitates frequent repeat clearings.

Chemical Vegetation Control: Herbicides can be sprayed or wicked on understory plants or injected into large, woody species. Modern herbicides (despite their high cost) are relatively safe, economical to apply, short-lived in the environment, and effective. Nonetheless, Park Service policy and public objections might discourage their use.

Control Burning of Vegetation. Control burning is an effective and inexpensive means of controlling small diameter vegetation. When used judiciously, there is little threat of control burns escaping to cause wildfires.

Control burns are most useful in relatively flat areas where flame height is more easily managed. Used primarily in commercial forestry, this method knocks back competing vegetation to permit increased diameter/height growth on crop trees. Usually, these crop trees are relatively fire-tolerant species (e.g., longleaf pine) or hardwoods nearing harvest.

Four factors make control burning on Richmond National Battlefield Park a delicate proposition:

1) Terrain. In some areas (especially Watt House and Ft. Darling), very steep slopes make safe control burning difficult. This is especially true at Ft. Darling in the southeast quadrant near the James River.

2) Fuel Load. Recent southern pine beetle-caused mortality has contributed to a massive dead wood buildup in many areas (especially Watt House, Cold Harbor, and Ft. Harrison). This material appears highly combustible and increases the chances of wildfire.

3) Smoke Management. Management of smoke can be a very delicate public relations issue, particularly in an urban area like Richmond. Proximity of the park to the airport further complicates smoke control.

4) Predisposition to Heart Rot. Even "cool burns" can damage the base of most hardwoods, thereby permitting entry of decay-causing fungi. Years (even decades) later, decay can progress so far that trees can no longer support themselves and succumb to wind breakage or uprooting.

Despite predisposing trees to decay, control burns in commercial hardwood stands are relatively common, especially late in the rotation cycle when resultant increased growth on crop trees outstrips loss to fire-caused decay caused by the burning.

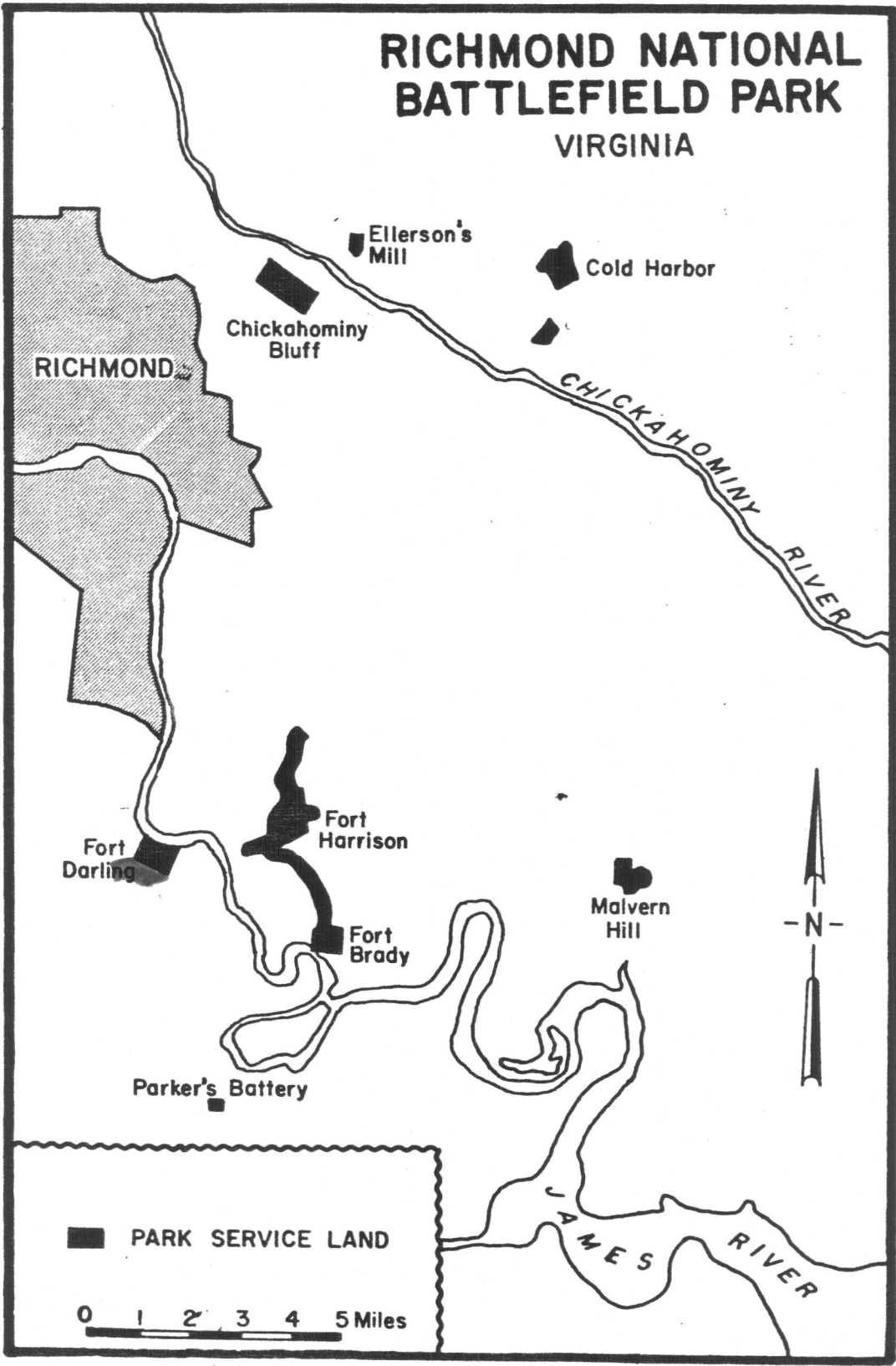
But Park Service land is reserved for perpetual management for recreation. Years in the future, decay could contribute to a widespread high hazard tree problem. Additionally, decay can spread to root systems, predisposing trees to windthrow. This can have a devastating impact on the park's breastworks and other historic areas.

Combination of Techniques. A combination of vegetation methods might represent the best approach. Hand clearing may be practical in particularly important areas. Control burning might best be used in flat, relatively open areas where a total control of small diameter material might be expected.

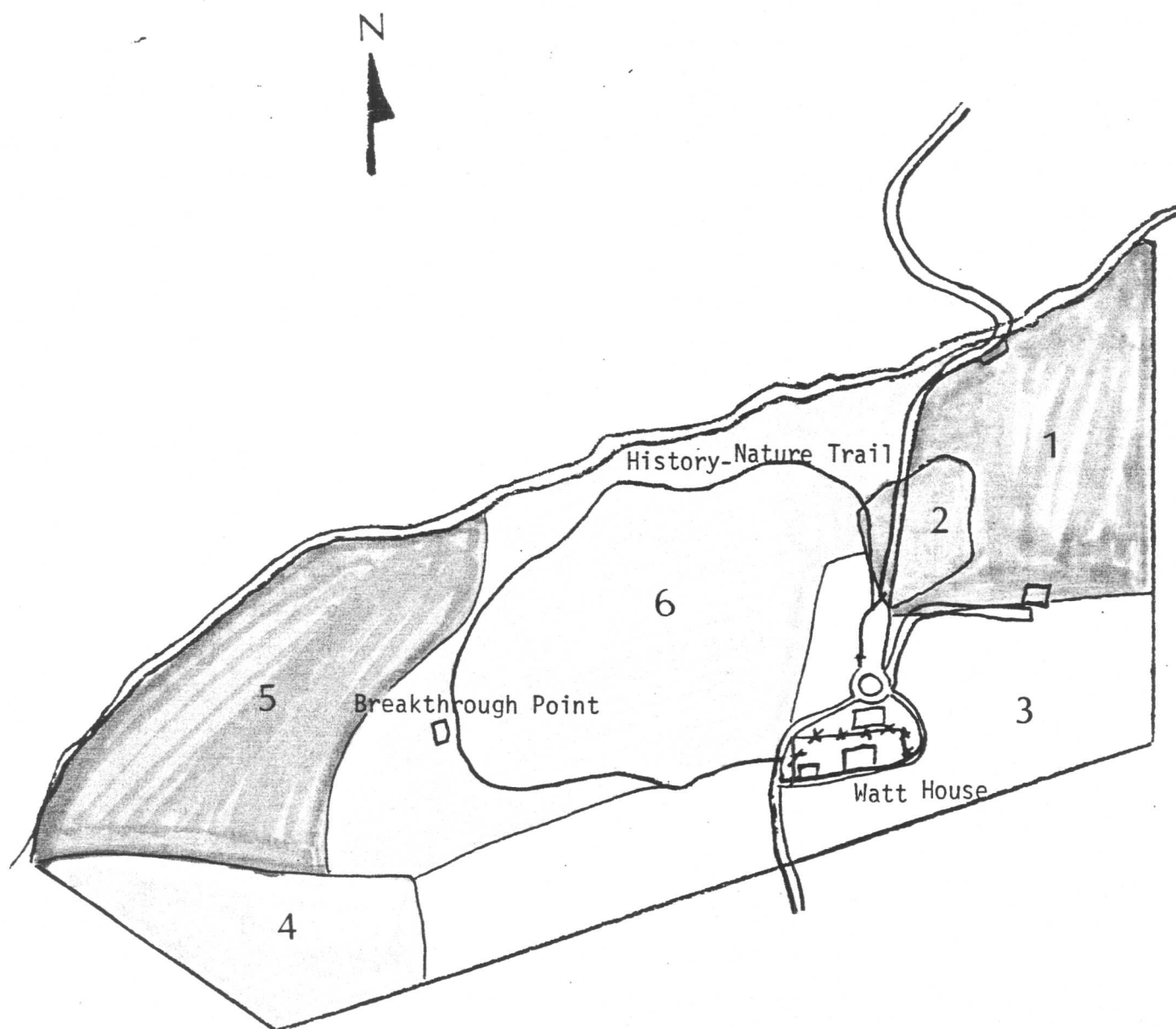
Additional Information. More detailed information on each of these techniques is available upon request from the USDA Forest Service.

A COMPARISON OF VEGETATION CONTROL ALTERNATIVES: RICHMOND NATIONAL BATTLEFIELD PARK

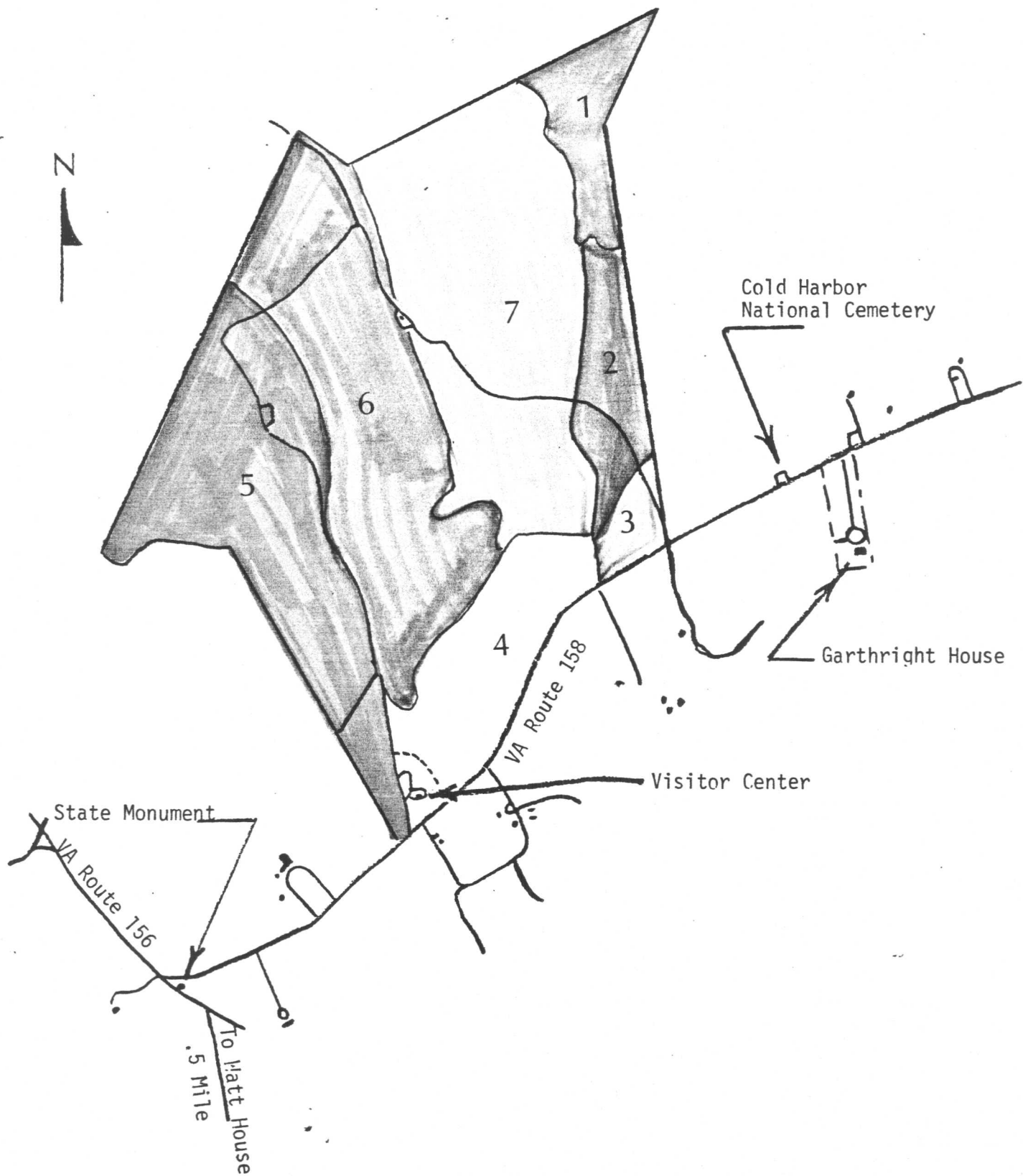
Method	Effectiveness	Cost	Possibility for Adverse Public Relations Consequences	Long-term adverse Consequences on Residual Stand
Mechanical	Moderate	High	Low	Low-moderate
Chemical	High	Moderate	High	Low
Control Burn	Moderate-High	Low	Moderate	High
Combination	High	Moderate	Moderate	Moderate

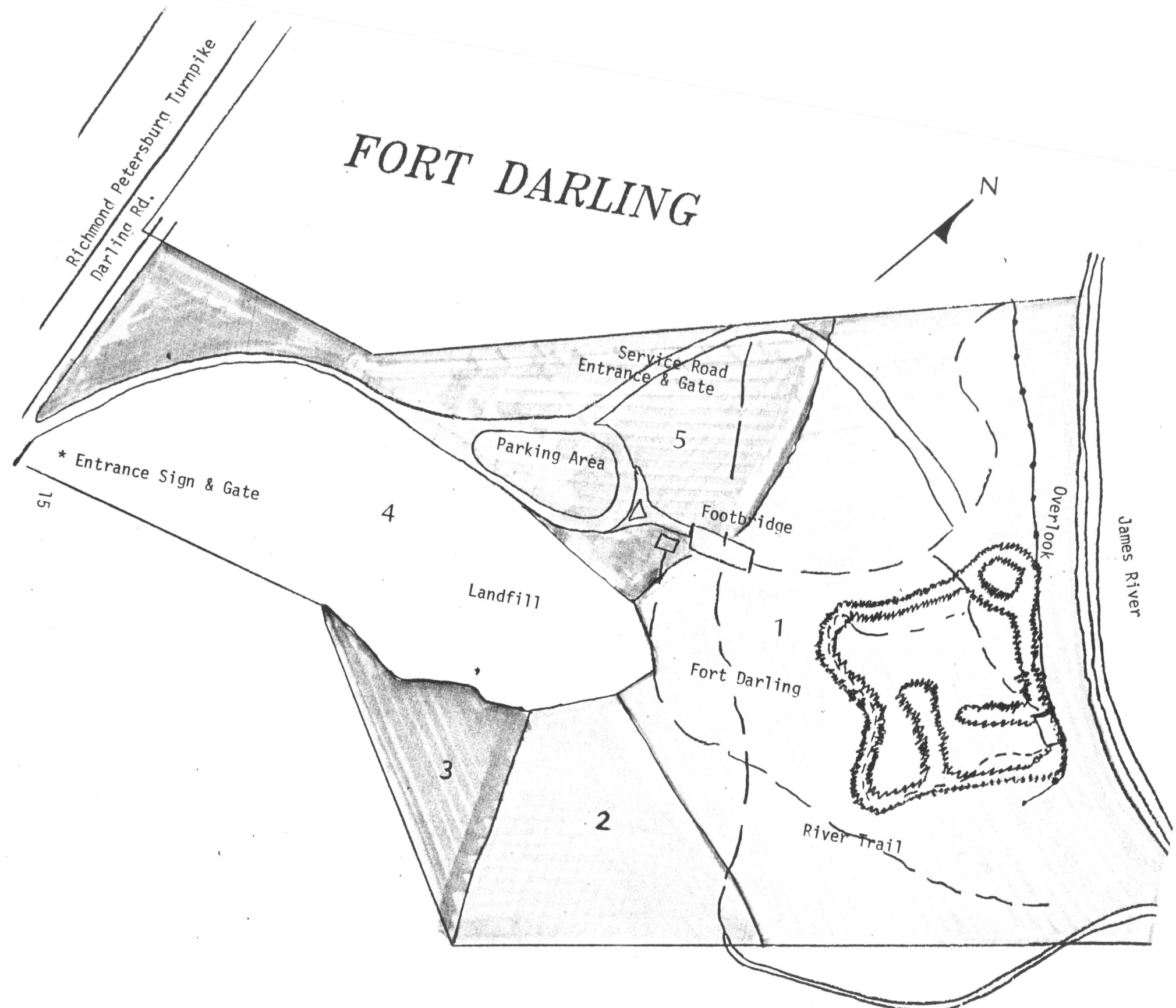


WATT HOUSE

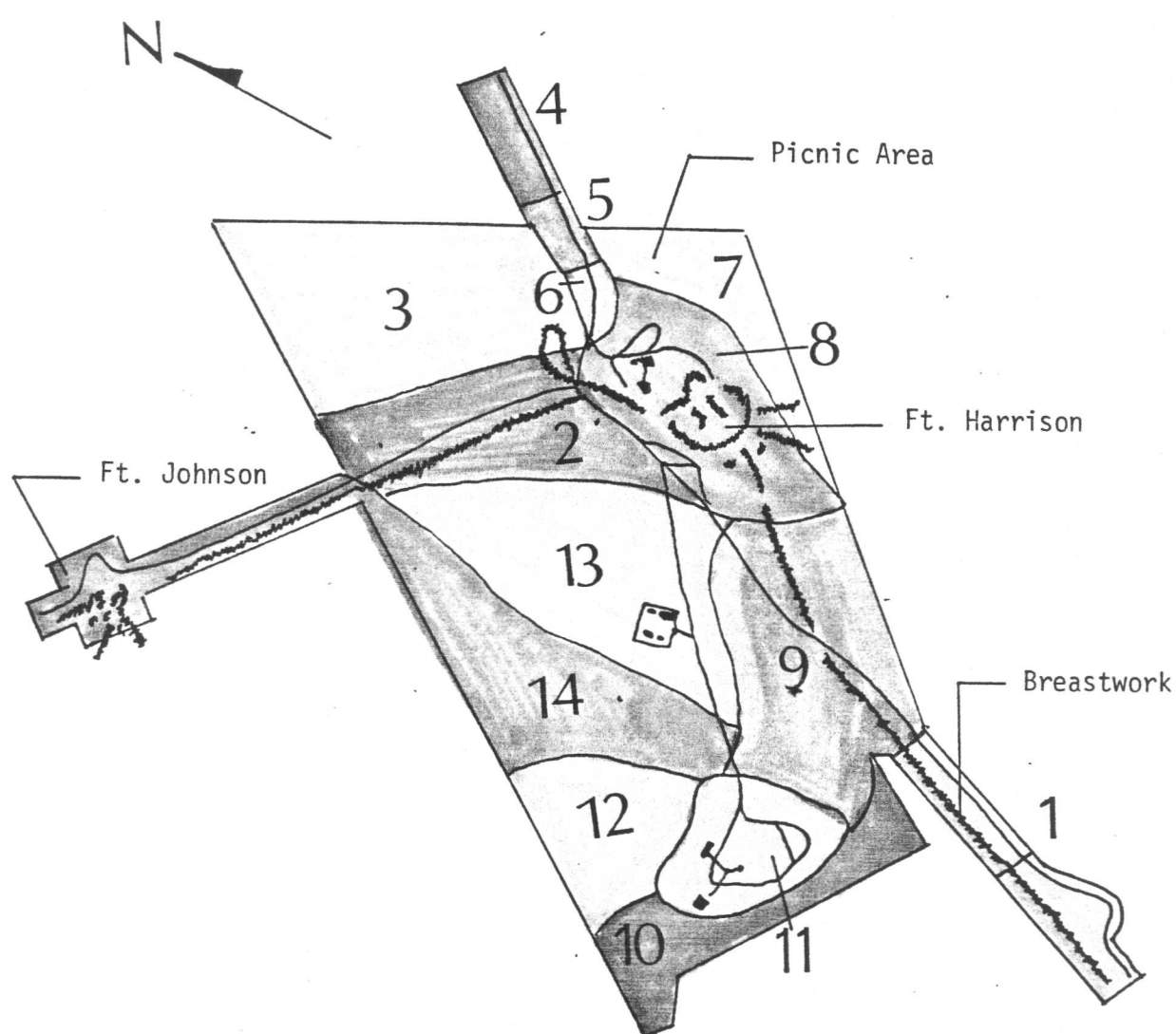


COLD HARBOR





FORT HARRISON



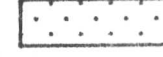
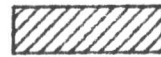
WATT HOUSE TOTAL VOLUME PER ACRE BY STAND

HARDWOOD
SAWTIMBER

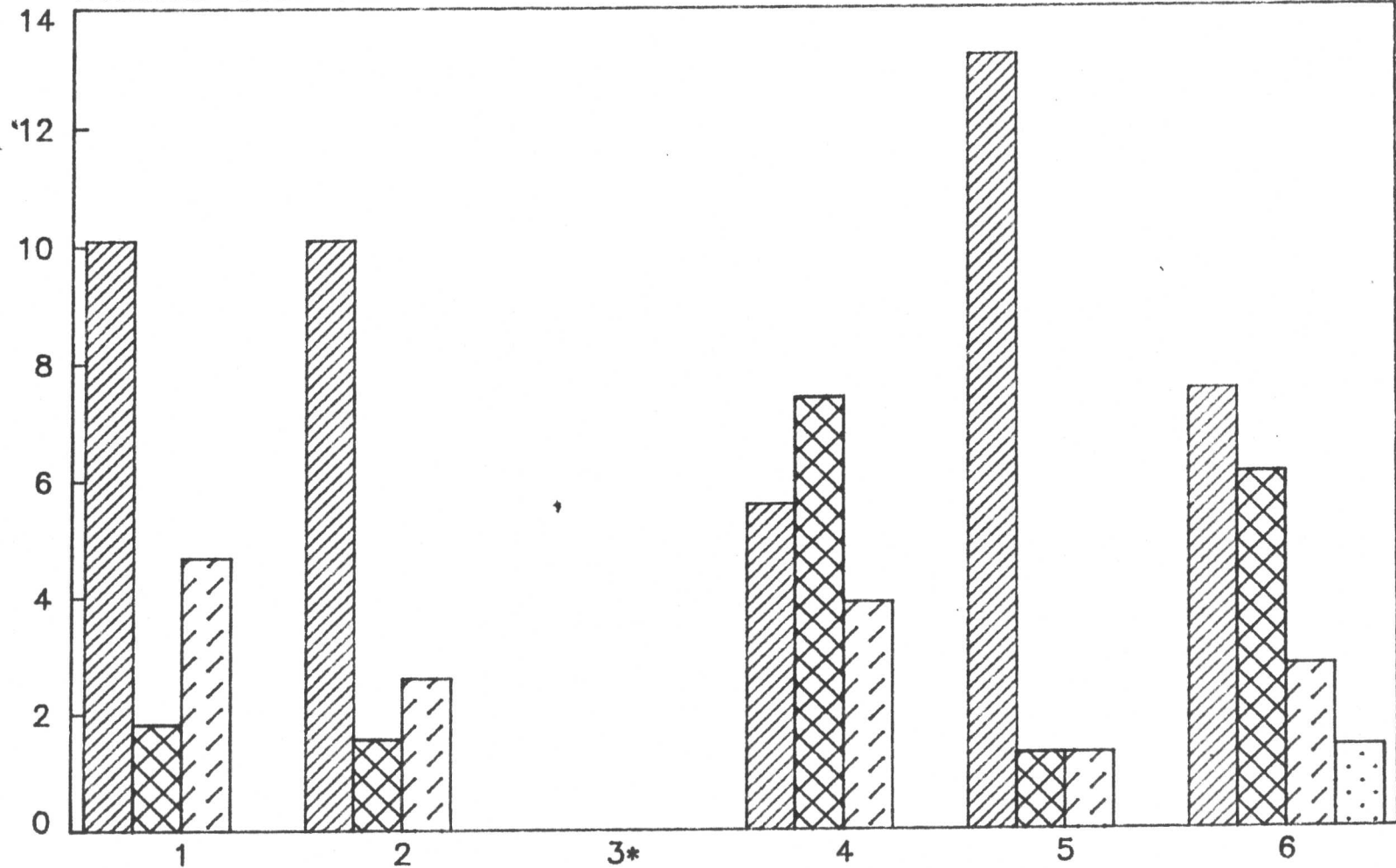
PINE
SAWTIMBER

HARDWOOD
POLETIMBER

PINE
POLETIMBER



HUNDRED CUBIC FEET



*NON-FORESTED AREA

COLD HARBOR

TOTAL VOLUME PER ACRE BY STAND

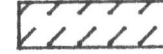
HARDWOOD
SAWTIMBER



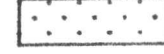
PINE
SAWTIMBER



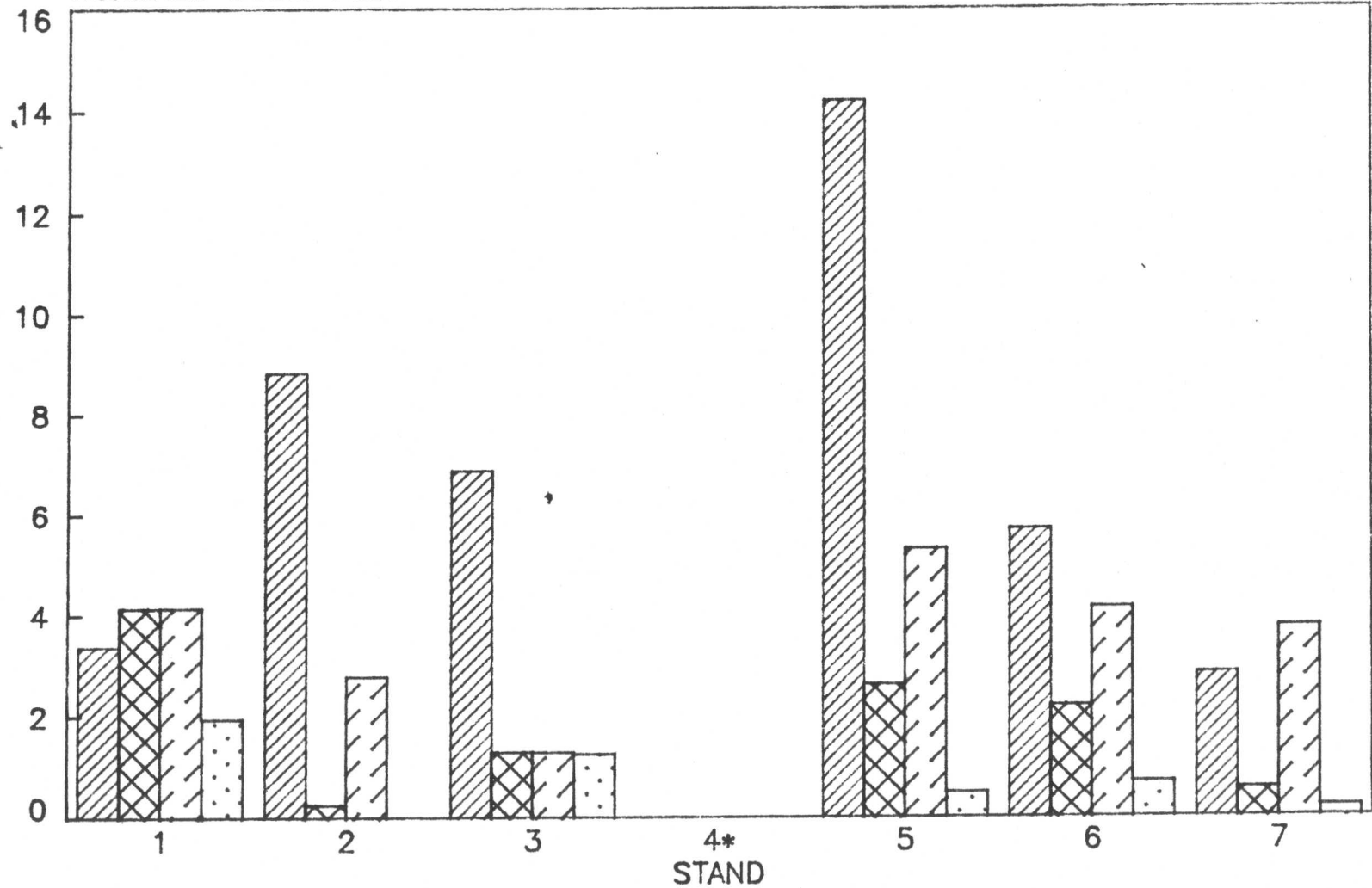
HARDWOOD
POLETIMBER



PINE
POLETIMBER



HUNDRED CUBIC FEET



*NON-FORESTED AREA

FORT DARLING

TOTAL VOLUME PER ACRE BY STAND

HARDWOOD
SAWTIMBER



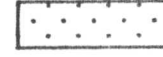
PINE
SAWTIMBER



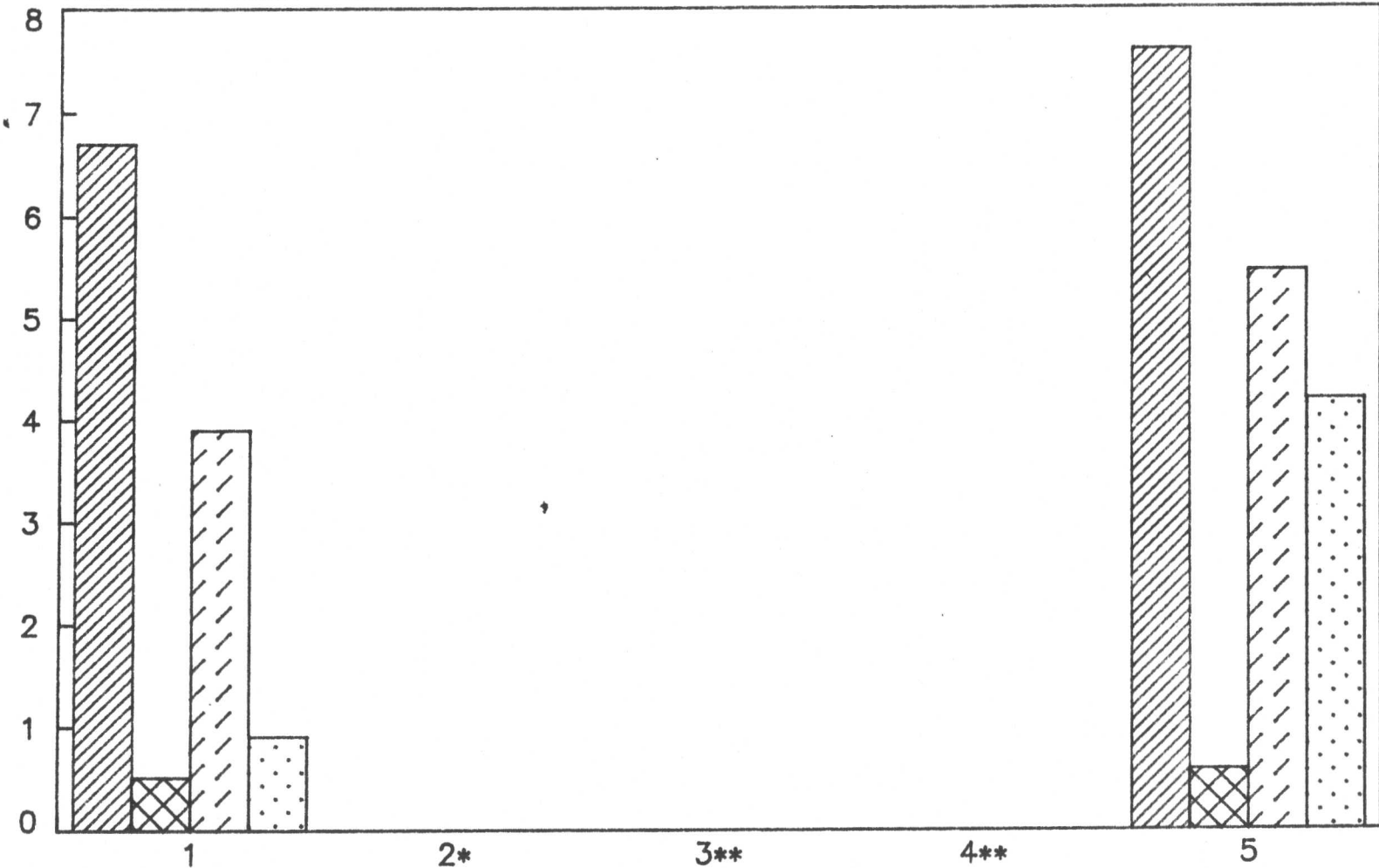
HARDWOOD
POLETIMBER



PINE
POLETIMBER



HUNDRED CUBIC FEET



*DENSE PINE SAPLING STAND; **NON-FORESTED AREA

FORT HARRISON (STANDS 1-7) TOTAL VOLUME PER ACRE BY STAND

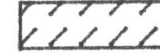
HARDWOOD
SAWTIMBER



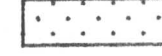
PINE
SAWTIMBER



HARDWOOD
POLETIMBER

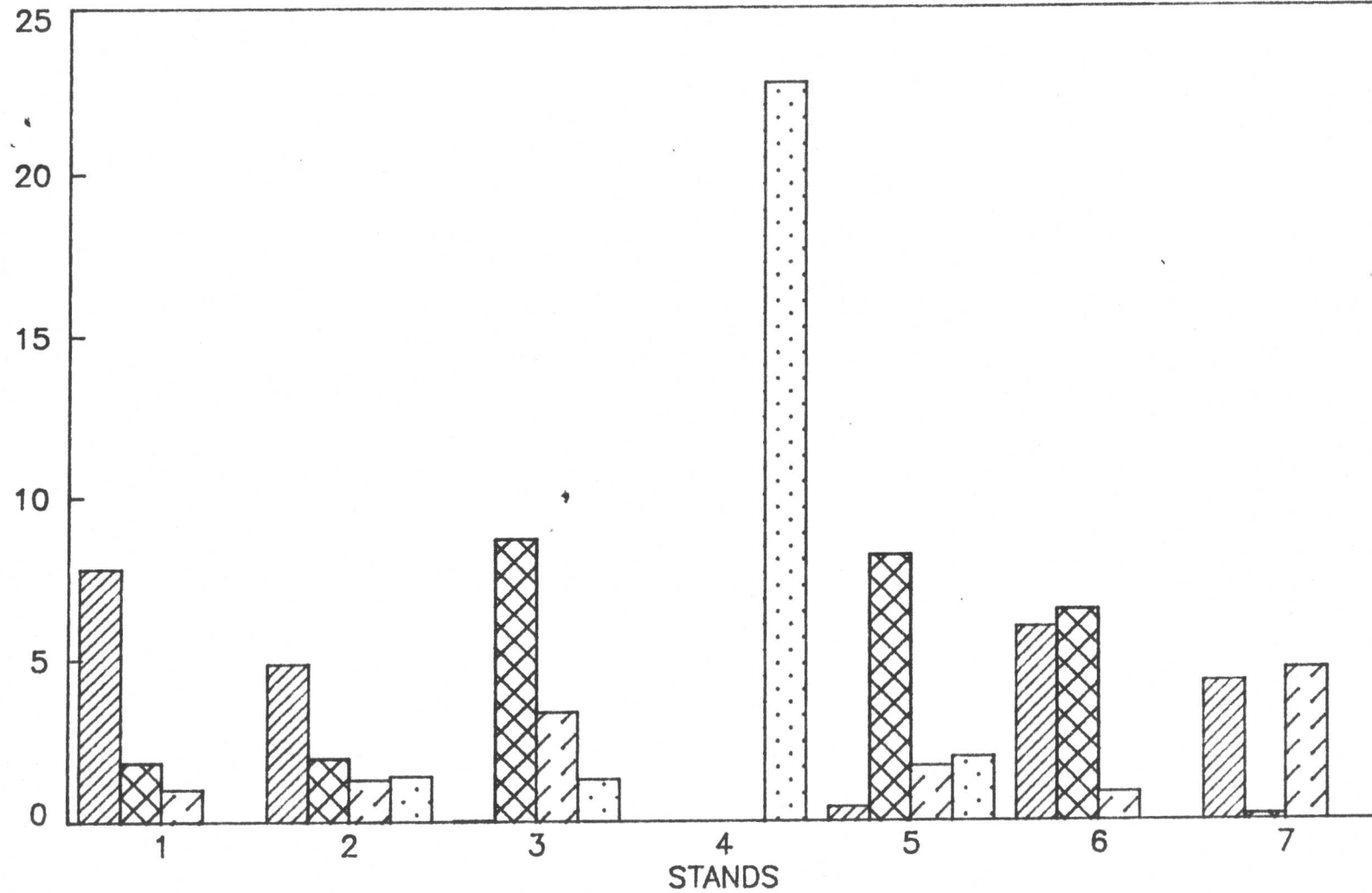


PINE
POLETIMBER



HUNDRED CUBIC FEET

20



FORT HARRISON (STANDS 8-14) TOTAL VOLUME PER ACRE BY STAND

HARDWOOD
SAWTIMBER



PINE
SAWTIMBER



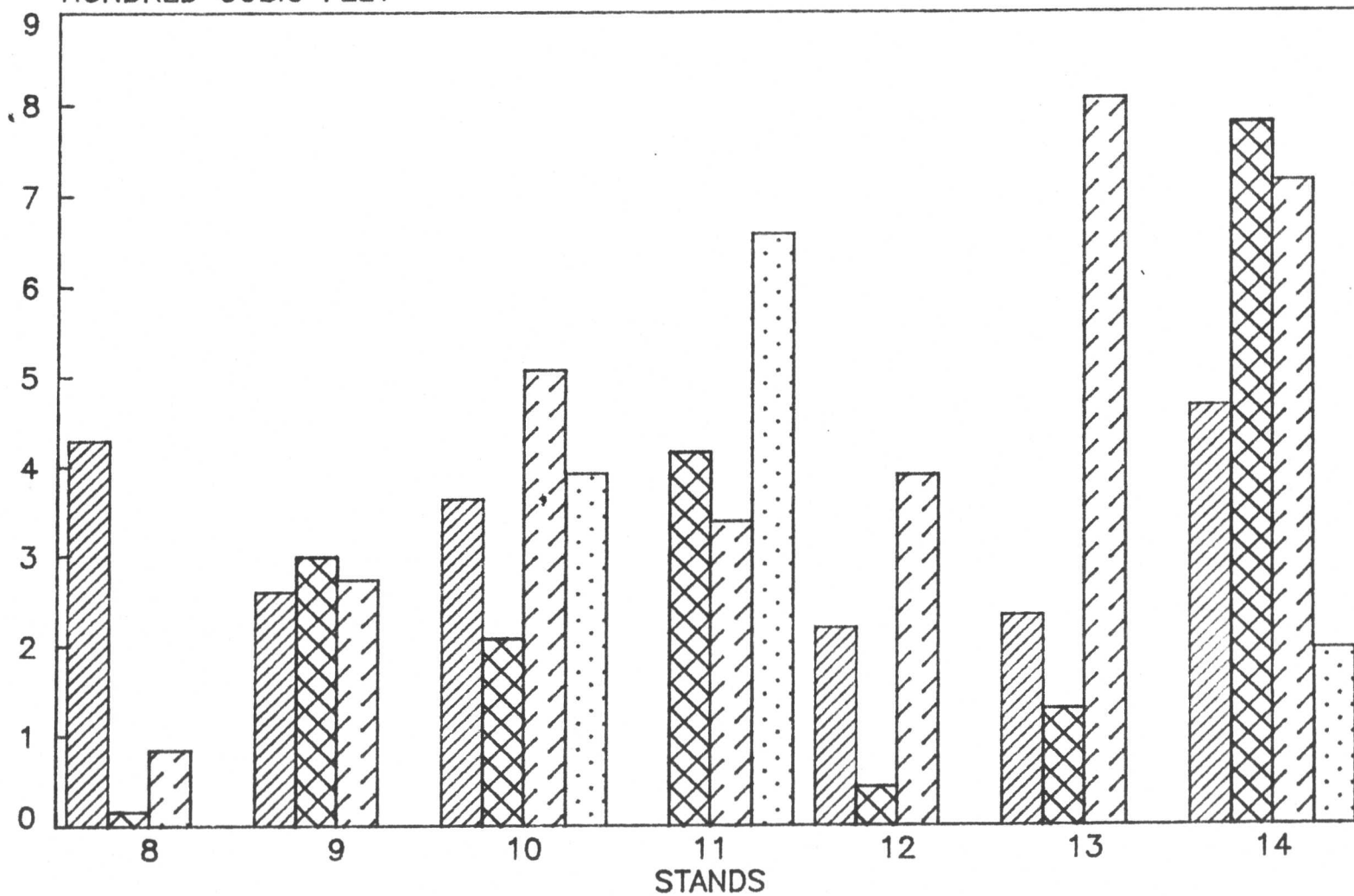
HARDWOOD
POLETIMBER



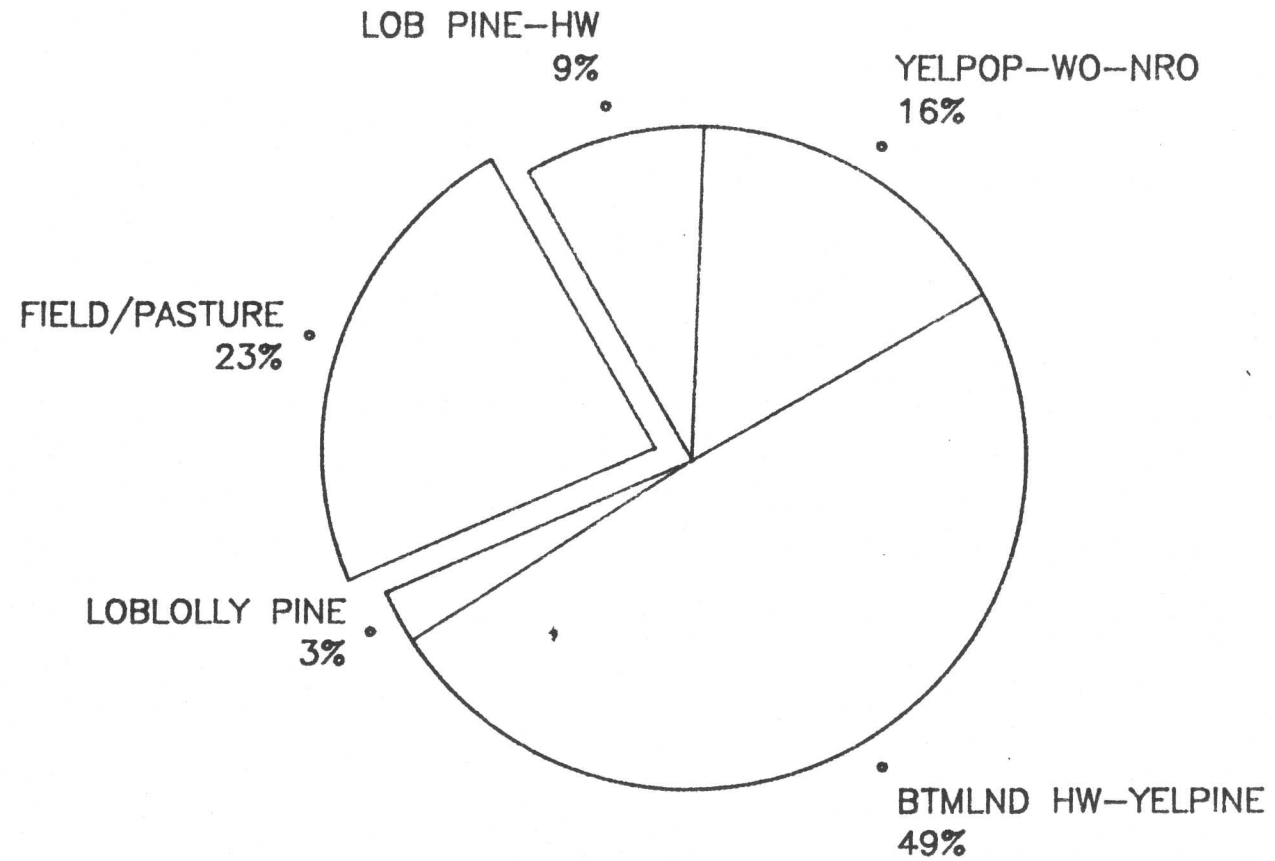
PINE
POLETIMBER



HUNDRED CUBIC FEET

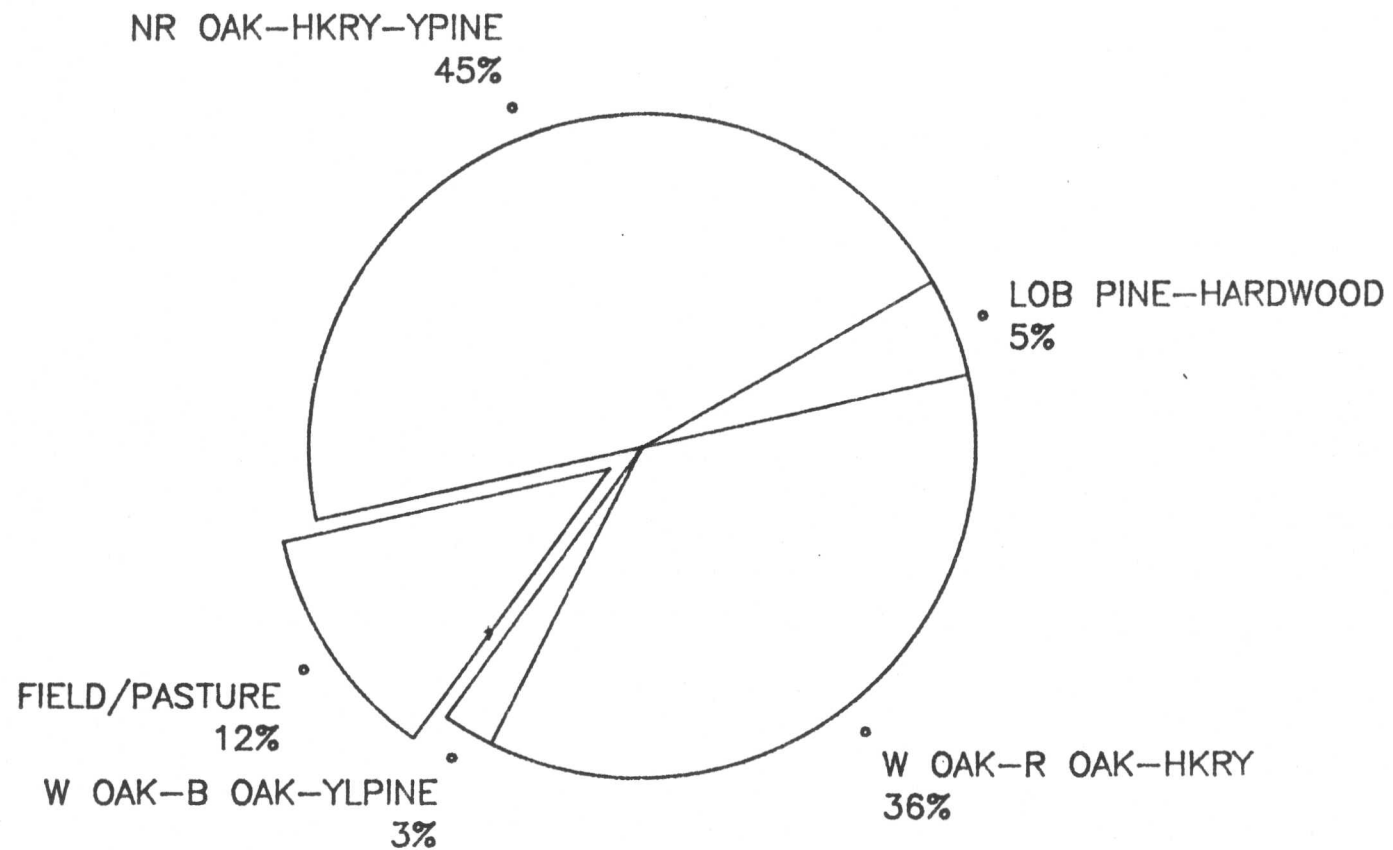


WATT HOUSE PERCENT COVER TYPE



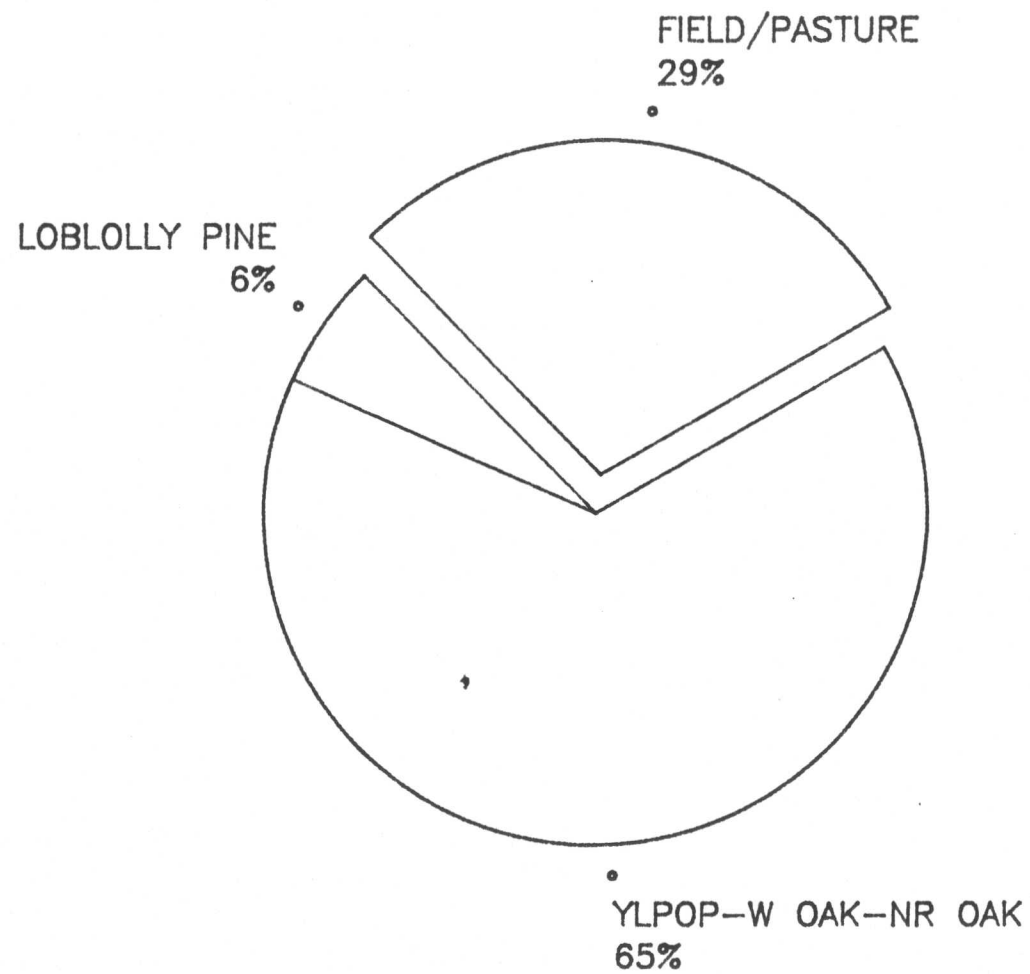
60.3 ACRES

COLD HARBOR PERCENT COVER TYPE



148.99 ACRES

FORT DARLING PERCENT OF COVER TYPE



42.4 ACRES