Federal Research Natural Areas in Oregon and Washington A Guidebook for Scientists and Educators. 1972.
Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

MEEKS TABLE RESEARCH NATURAL AREA[1]

Ponderosa pine/pinegrass forest and intermingled stiff sagebrush-grass communities characteristic of the eastern slopes of the Washington Cascade Range.

The Meeks Table Research Natural Area was established in July 1948 to exemplify ponderosa pine/pinegrass *(Pinus ponderosa/Calamagrostis rubescens)* communities and associated grasslands typical of the Cascade Range in eastern Washington. The 27-ha. (68-acre) tract is located in Yakima County, Washington, and administered by the Naches Ranger District (Naches, Washington), Snoqualmie National Forest. Its elongated oval shape is dictated by topography (fig. ME-I). It is located in sections 5 and 6, T. 15 N., R. 14 E., Willamette meridian, at $46^0$15' N. latitude and $121^0$05' W. longitude.

ACCESS AND ACCOMMODATIONS

The tract is located about 65 km. (40 miles) northwest of Yakima and is approached via U.S. Highway 410. Directions should be obtained at the Naches Ranger Station for identifying the graveled Forest Service roads to the area and the trailhead location which leads to Meeks Table along a single, steep, narrow ridge. Access during summer is good but becomes very difficult during the winter due to snow. Public accommodations are available in Yakima and Naches; primitive forest camps are found in the vicinity of Meeks Table.

[1]Description prepared by Drs. Arthur R. Tiedemann, G. O. Klock, and H. W. Berndt, U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Forest Hydrology Laboratory, Wenatchee, Washington, and Dr. F. C. Hall, U.S. Department of Agriculture, Forest Service, Region 6, Portland, Oregon.

ENVIRONMENT

The Meeks Table Research Natural Area varies in elevation from 1,280 to 1,585 m. (4,200 to 4,525 ft.). Topographically, Meeks Table is an isolated flat-topped butte, a remnant of a former basalt-capped plateau, rising 150 m. (500 ft.) above the surrounding rolling terrain. It is surrounded by precipitous cliffs with a 60- to 90-m. (200- to 300-ft.) vertical drop to talus slopes below.

A modified continental climate prevails. Most precipitation occurs as snow during the cool, cloudy winter. Summers are warm, generally low in precipitation, and largely cloudless. One to 3 months of drought are common. Climatic data from Bumping Lake located in a valley 16 km. (10 miles) west are as follows (U.S. Weather Bureau 1965):

Mean annual temperature	4.7°C. (40.4°F.)
Mean January temperature	−4.9°C. (23.1°F.)
Mean July temperature	14.5°C. (58.2°F.)
Mean January minimum temperature	−10.0°C. (13.9°F.)
Mean July maximum temperature	23.6°C. (74.5°F.)
Average annual precipitation	1,214 mm. (47.8 in.)
July through August precipitation	69 mm. (2.7 in.)
Average annual snowfall	554 cm. (218.0 in.)

It is undoubtedly much drier and summers are warmer on the natural area itself.

Soils in the area have not been mapped, but some descriptions available in Rummell's (1951) research report follow. Weakly podzolized soils occur under forested stands which are developed in approximately 20 em. (8 in.) of volcanic ash over buried materials. A densely matted, freshly decomposed mull humus 5 em. (2 in.) thick, which is derived from

pinegrass and conifer needle litter, covers the soil surface. Horizon sequences are:

A1	0 to 5 cm.	Light gray ashy sand with little organic matter; pH 6.4.
A2	5 to 20 cm.	Light brown loamy textured volcanic ash; crumb structure; abundant roots; pH 6.4.
B2	20 to 45 cm.	Gritty clay with strongly developed nut structure and colloidal staining on cleavage surfaces; pH 5.8.
IIBb	45 to 50 cm.+	Black fragmented clay; entire mass is dense waxy deposit.

The light-gray, ashy sand observed by Rummell appears to be lenses of volcanic ash resulting from the eruption of Mount Mazama or Mount St. Helens. In the IIBb horizon, remnants of glacial till have been observed. Shallower, nonpodzolized soils (Regosols or Entisols) occur in areas of sagebrush and grass which commonly have a biscuitswale microtopography. These soils are stonier since they lack the wind-deposited ash layers found on forested sites. The horizon sequence in a deeper, biscuit-type area is:

A1	0 to 15 cm.	Light brown loam; friable crumb structure; 20 to 40 percent stone.
B2	15 to 40 cm.	Brown gritty clay; cleavage planes show colloidal staining; 30 to 50 percent stone; pH 6.5.
D	40 cm.+	Moderately cracked bedrock of biabase material; slight lime depositions on rock surfaces.

There is little or no litter or organic layer present. Very shallow soils 5 to 10 em. (2 to 6 in.) deep occur along the windward side (southwest rim) of the butte and are occupied by very sparse vegetation.

BIOTA

Estimated areas by plant community are:

Name	*Area*
Stipa columbiana-Phlox diffusa-Artemisia rigida	10 ha. (25 acres)
Poa sandbergii-Eriogonum douglasi-Artemisia rigida	4 ha. (11 acres)
Pinus ponderosa/Calamagrostis rubescens-Lupinus laxiflorus	7 ha. (17 acres)
Pseudotsuga menziesii/ Calamagrostis rubescens-Arnica cordifolia	6 ha. (15 acres)

The areas of *Pinus/Calamagrostis-Lupinus* can be assigned to SAF cover type 237, Interior Ponderosa Pine (Society of American Foresters 1954), and Kiichler's (1964) Type 11, Western Ponderosa Pine Forest. The areas of *Pseudotsuga/Calamagrostis-Arnica* can be assigned SAF forest cover type 214, Ponderosa Pine-Western Larch-Douglas-Fir, and probably to Kuchler's Type 12, Douglas Fir Forest. The grass-stiff sagebrush *(Artemisia rigida)* communities probably fall within Kuchler's Type 55, Sagebrush Steppe. The entire tract appears to fall within the *Abies grandis* Zone found on the eastern slope of Washington's Cascade Range (Franklin and Dyrness 1969).

The *Poa sandbergii-Eriogonum douglasi--Artemisia rigida* community is found on the north and south extremes of Meeks Table (figs. ME-2 and ME-3). These are harsh, rocky outcrops with little soil development and sparse vegetative cover (22 percent). Low forbs and halfshrubs such as *Sedum stenopetallum, Arenaria congesta,* and *Eriogonum douglasi* account for more than half of the vegetal cover (table ME-I). Sandberg bluegrass *(Poa sandbergii)* and bottlebrush squirreltail *(Sitanion hystrix)* are the most abundant perennial grasses. Cheatgrass *(Bromus tectorum)* is common in this community. Bitterbrush *(Purshia tridentata)* and stiff sage comprise most of the shrub cover. Soil depth varies from 5 em. (2 in.) to 6 dm. (2 ft.). Soils are lower in cation exchange capacity, organic matter, and total nitrogen than the other communities on the Table (table ME-2). This community is similar to those found on the *Artemisia rigida-Poa sandbergii* habitat type described by Daubenmire (1970). Transitions with the forested communities and the

Stipa-Phlox-Artemisia community are gradual, with bitterbrush occurring mainly in this zone.

Stipa columbiana-Phlox diffusa-Artemisia rigida is the most extensive community type on Meeks Table, occurring in large openings between the forested areas (figs. ME-2 and ME-3). Total vegetal cover is 41 percent. Columbia needlegrass *(Stipa columbiana),* pinegrass *(Calamagrostis rubescens),* and Sandberg bluegrass are the predominant grasses (table ME-I). Numerous forbs and half-shrubs account for more than half of the cover in this community. *Sedum* is the most common forb and *Phlox diffusa* the most common halfshrub. Small annual forbs such as *Collinsia parviflora* and *Polygonum kelloggii* occur frequently. Stiff sage is the most common shrub but accounts for only 10 percent of the total cover. This community resembles sagebrush-grass communities which have been depleted by livestock overuse; however, livestock have never grazed Meeks Table. Within this community, there are areas resembling biscuit-swale topography with islands of pinegrass and bluebunch wheatgrass *(Agropyron spicatum.).* Soil depth ranges from 6 dm. (2 ft.) to 2.7 m. (9 ft.). Soil bulk density and pH are the highest of any of the communities (table ME-2). Contents of organic matter and total nitrogen are intermediate. Transition to the forest communities is marked by an abrupt rise in the topograpby of 15 to 30 em. (6 to 12 in.) similar to the rise in the islands in the biscuit-swale topography.

The *Pinus ponderosa/Calamagrostis rubescens/Lupinus laxiflorus* community has a stocking rate of 91 trees per ha. (37 trees per acre). Of these, 80 are ponderosa pine and 11 are Douglas-fir *(Pseudotsuga menziesii).* Ponderosa pines average 64-cm. (25-in.) d.b.h. and vary from sapling size to 163 em. (64 in.). The scattered Douglas-fir trees have an average d.b,h. of 46 em. (18 in.) and range in size from saplings to 84 em. (34 in.). Reproduction of both tree species is sparse. Crown cover of the overstory averages 26 percent but is as great as 70 percent in places. Cover of understory vegetation is 76 percent and clearly dominated by pinegrass and elk sedge *(Carex geyeri)* (table ME-I). These two species comprise two-thirds of the understory cover. *Lupinus laxiflorus* is the most abundant forb. Soils are 3 to 5 m. (10 to 17 ft.) deep and have the highest level of total nitrogen of any of the communities (table ME-2).

The *Pseudotsuga menziesii/Calamagrostis rubescens-Arnica cordifolia* community differs from the *Pinus/Calamagrostis-Lupinus* community in composition and cover of both overstory and understory and in stocking rate. Average number of trees per ha. is 398 (161 per acre) of which 234 (95 per acre) are Douglas-fir, 90 (36 per acre) are ponderosa pine, and the remainder are western larch *(Larix occidentalis)* and grand fir *(Abies grandis).* Douglas-fir trees range in size from saplings to 117 em. (46 in.), averaging 36 em. (14 in.). Ponderosa pine, western larch, and grand fir average 43-cm. (17-in.), 36-cm. (14in.), and 13-cm. (5-in.) d.b.h., respectively. Reproduction of Douglas-fir and grand fir is good. Crown cover of trees ranges from 20 to 100 percent and averages 51 percent. For such a high percentage of tree cover, the 46percent crown cover of understory vegetation is surprisingly high. Three-fourths of this cover is pinegrass and elk sedge (table ME-I). *Arnica cordifolia* is the predominant forb. Soil depth varies from 2 to 4.5 m. (7 to 15 ft.). Properties are similar to the soil of the *Pinus/ Calamagrostis-Lupinus* community except that bulk density and total nitrogen are lower (table ME-2).

Both of the forested communities are probably occupying habitats analogous to the *Pseudotsuga menziesii-Calamagrostis rubescens* habitat type of Daubenmire and Dauben mire (1968).

Mammals believed to utilize the natural area as residents or transients are listed in table ME-3.

HISTORY OF DISTURBANCE

Fire scars on ponderosa pine (fig. ME-3) indicate ground fires periodically burned the area prior to initiation of fire control programs in 1910. Lack of dominant old-growth Douglas-fir or grand fir and lush

grass growth further suggest that virtually all portions of Meeks Table were burned by ground fires. Catfaces on tall ponderosa pine attest to numerous lightning strikes on the butte.

Domestic livestock have never grazed the area because the very narrow, precipitous trail at the butte's west end is inimical to livestock passage. No other disturbance is known.

RESEARC H

Rummell (1951) evaluated the un-grazed vegetation and soils on Meeks Table and compared them with those on Devil's Table, about 16 km. (10 miles) distant, an area which had been overgrazed by livestock. Detailed studies of the vegetation and soils are in progress and some of the results are incorporated into this description; a complete report will be published in the future.[2]

The Meeks Table Research Natural Area provides interesting research opportunities: (1) on forest succession without a past history of livestock use; (2) on vegetation-soil relationships in relation to the intricate pattern of forested and non-forested plant communities; and (3) as a benchmark area for evaluating adjacent stands which have been grazed and logged.

MAPS AND AERIAL PHOTOGRAPHS

No special topographic or geologic maps are available for the natural area which are sufficiently detailed to be useful. Either the District Ranger (Naches Ranger District) or Forest Supervisor (Snoqualmie National Forest, Seattle, Washington) can provide details on the most recent aerial photo coverage of the area.

[2] Research by Drs. A. R. Tiedemann, G. O. Klock, and H. W. Berndt, U.S. Forest Service, Forest Hydrology Laboratory, Wenatchee, Washington.

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Table ME-1. — Percent frequency and coverage of various plant species and groups within four plant communities on Meeks Table Research Natural Area

Plant life form and species	Community type: *Poa-Eriogonum-Artemisia*		*Stipa-Phlox-Artemisia*		*Pinus/Calamagrostis-Lupinus*		*Pseudotsuga/Calamagrostis-Arnica*	
	Frequency	Cover	Frequency	Cover	Frequency	Cover	Frequency	Cover
Grasses and sedges:								
Poa sandbergii	78	1.6	63	1.6				
Danthonia unispicata	22	.3	24	.8				
Sitanion hystrix	36	.9	29	.3				
Bromus tectorum	44	.9						
Stipa columbiana			90	8.8			10	1.0
Calamagrostis rubescens			12	2.4	100	42.7	77	19.3
Carex geyeri					90	11.2	97	12.0
Other grasses and sedges		.8		1.4		1.4		[1]
Total grasses and sedges		4.5		15.3		55.3		32.3
Forbs and halfshrubs:								
Eriogonum douglasi	54	1.9						
Antennaria dimorpha	60	1.4						
Arenaria congesta	76	1.0						
Sedum stenopetallum	92	1.4	68	1.1				
Allium acuminatum	26	[1]						
Lewisia rediviva	22	[1]						
Phlox diffusa			51	4.3				
Madia glomerata			41	.6				
Lomatium triternatum			41	.5				
Lomatium dissectum			41	.6				
Lomatium nudicaule			42	.8				
Collinsia parviflora			40	.1				
Polygonum kelloggii			49	.3				
Achillea millefolium					63	3.3		
Anaphilis margaritacea					50	.8		
Lupinus laxiflorus					96	8.3	47	1.7
Erythronium grandiflorum					47	.7	27	.2
Arnica cordifolia					70	3.0	90	6.5
Hieracium cynoglossoides					40	.7		
Frasera speciosa							13	1.0
Osmorhiza chilensis							13	.8
Other forbs and halfshrubs		6.3		13.9		3.7		2.2
Total forbs and halfshrubs		12.0		21.6		20.5		12.4
Shrubs:								
Artemisia rigida	26	1.4	49	3.7				
Purshia tridentata	12	2.9						
Arctostaphylos uva-ursi	2	.8					3	.3
Potentilla fruticosa			13	.2				
Holodiscus discolor					3	.2		
Ribes spp.							7	.5
Total shrubs		5.1		3.9		.2		.8
Total, all plants		21.6		40.8		76.0		45.5

[1]Trace.

Table ME-2. — Properties of the upper 8 cm. of soil on Meeks Table Research Natural Area

Community	Bulk density	Moisture percentage		Cation exchange capacity	pH	Organic matter	Total N	Total S
	g/cm.^{3}	.06 atm.	15 atm.	me./100 g.		.....	Percent	.....
Stipa-Phlox-Artemisia	1.30	28	15	26	6.3	3.2	0.14	0.018
Pinus/Calamagrostis-Lupinus	1.07	32	18	25	5.9	4.6	.18	
Pseudotsuga/Calamagrostis-Arnica	.96	36	23	24	5.9	4.0	.12	.011
Poa-Eriogonum-Artemisia	1.08	33	21	16	6.2	2.2	.09	

Table ME-3. — Tentative list of mammals for Meeks Table Research Natural Area

Order	Scientific name	Common name
Insectivora	*Neürotrichus gibbsi*	shrew mole
	Scapanus orarius	coast mole
	Sorex cinereus	masked shrew
	Sorex obscurus	dusky shrew
	Sorex trowbridgii	Trowbridge shrew
	Sorex vagrans	wandering shrew
Chiroptera	*Antrozous pallidus*	pallid bat
	Eptesicus fuscus	big brown bat
	Lasionycteris noctivagans	silver-haired bat
	Lasiurus borealis	red bat
	Lasiurus cinereus	hoary bat
	Myotis californicus	California myotis
	Myotis evotis	long-eared myotis
	Myotis lucifugus	little brown myotis
	Myotis thysanodes	fringed myotis
	Myotis volans	long-legged myotis
	Myotis yumanensis	Yuma myotis
	Plecotus townsendi	Townsend big-eared bat
Lagomorpha	*Lepus americanus*	snowshoe hare
	Lepus californicus	black-tailed jack rabbit
	Lepus townsendi	white-tailed jack rabbit
	Ochotona princeps	pika
	Sylvilagus nuttalli	mountain cottontail
Rodentia	*Clethrionomys gapperi*	Gapper red-backed vole
	Erethizon dorsatum	porcupine
	Eutamias amoenus	yellow-pine chipmunk
	Eutamias townsendi	Townsend chipmunk
	Glaucomys sabrinus	northern flying squirrel
	Microtus longicaudus	long-tailed vole
	Microtus montanus	mountain vole
	Microtus oregoni	Oregon or creeping vole
	Neotoma cinerea	bushy-tailed wood rat
	Perognathus parvus	Great Basin pocket mouse
	Peromyscus maniculatus	deer mouse
	Sciurus griseus	western gray squirrel
	Spermophilus saturatus	Cascades mantled ground squirrel
	Spermophilus townsendi	Townsend ground squirrel
	Tamiasciurus douglasi	chickaree
	Thomomys talpoides	northern pocket gopher
Carnivora	*Canis latrans*	coyote
	Felis concolor	mountain lion or cougar
	Lynx rufus	bobcat
	Martes americana	marten
	Mustela erminea	short-tailed weasel or ermine
	Mustela frenata	long-tailed weasel
	Taxidea taxus	badger
	Ursus americanus	black bear
	Vulpes fulva	red fox
Artiodactyla	*Cervus canadensis*	wapiti or elk
	Odocoileus h. hemionus	mule deer

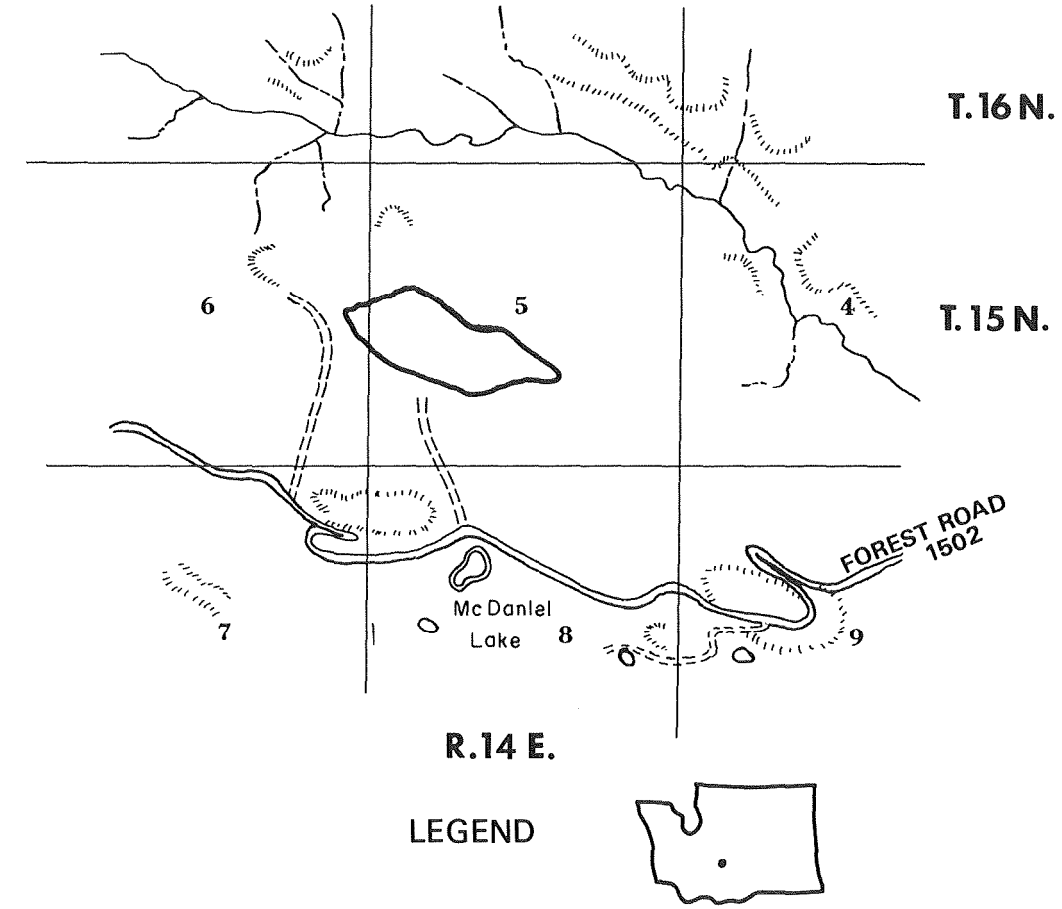

Figure ME-1.– Meeks Table Research Natural Area, Yakima County, Washington.

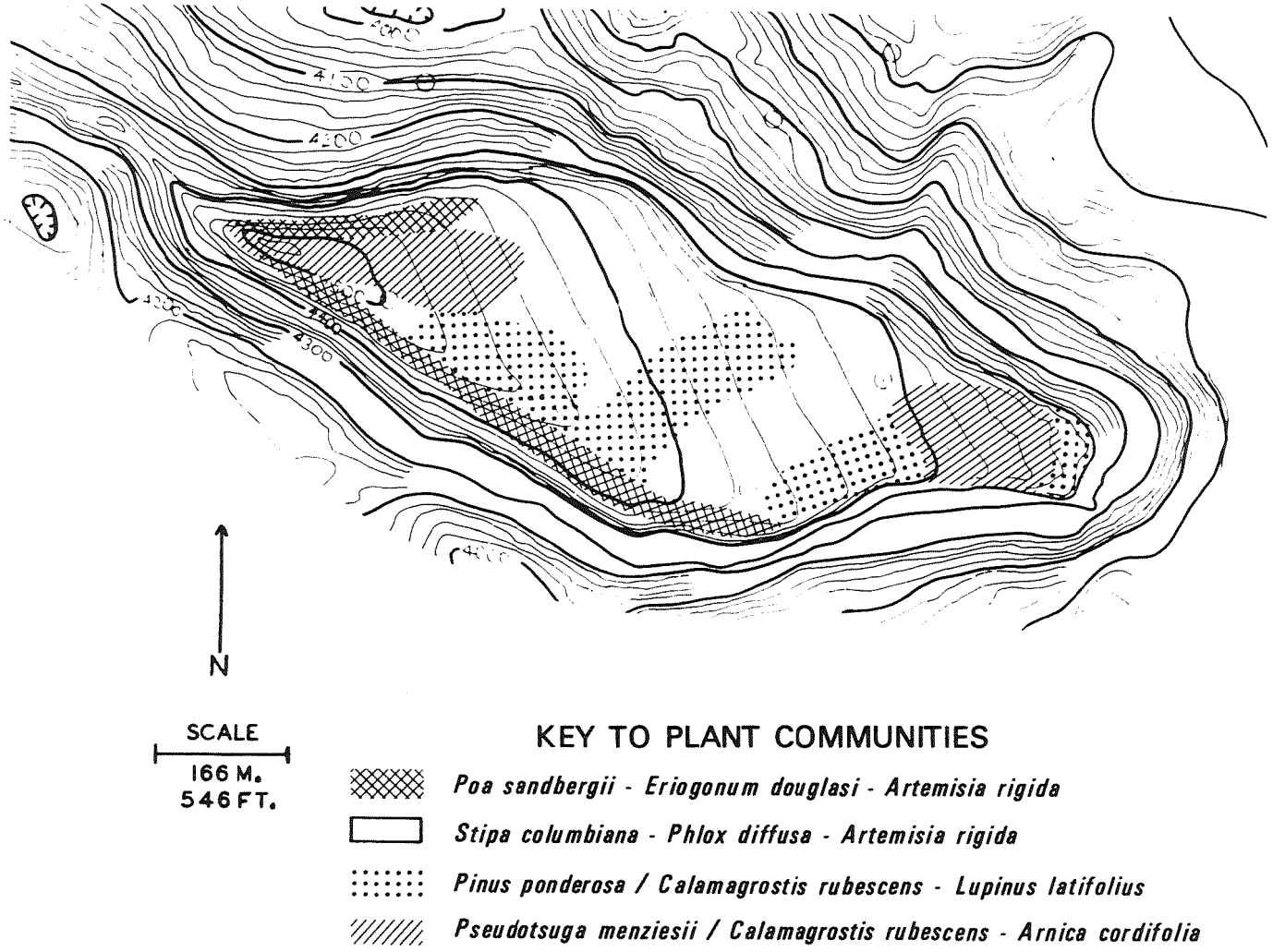

Figure ME-2.– Distribution of plant communities on Meeks Table Research Natural Area; contour interval is approximately 6 m. (20 ft.).

Figure ME-3.-Communities of Meeks Table Research Natural Area. Upper left: *Pinus/Calamagrostis-Lupinus* community; tree reproduction is scant and fire scars common (note tree left of meter board). Upper right: *Pseudotsuga/Calamagrostis-Arnica* community; Douglas-fir and grand fir dominate the reproduction. Lower left: *Poa-Eriogonum-Artemisia* community. Lower right: *StipaPhlox-Artemisia* community.