

Team Number: \_\_\_\_\_

Team Name: \_\_\_\_\_

Team Equipment Color: \_\_\_\_\_

## 2005 CALIFORNIA ENVIROTHON FORESTRY STATION

**Time allowed 35 minutes**

Total = 100 points

- a) Please write the Team Number on the top of each page of this test.
- b) You may un-staple the test and work on questions in any order, however, pages must be returned to the correct order when they are turned in. You may choose to split your team up and work on multiple questions to expedite the process.
- c) Please write clearly. If I can't read it, you haven't answered it.

Please show all your work, as you may obtain partial credit.      **GOOD LUCK!**

### Taxonomy and Dendrology

1. Trees common to this region are listed below. Fill in the appropriate blanks with either: the common name, Genus, or species that corresponds to each. Also, please indicate which trees are found at this test station. **(10 points)**

<u>COMMON NAME</u>	<u>GENUS</u>	<u>SPECIES</u>	Found on Site? Y = Yes N = No
Grey Pine	_____	sabiniana	_____
Douglas Fir	Psudotsuga	_____	_____
Incense Cedar	_____	decurrens	_____
_____	Pinus	jeffreyi	_____
White Fir	Abies	_____	_____
Giant Sequoia	_____	giganteum	_____
Black Oak	_____	kelloggii	_____
_____	Abies	magnifica	_____
Ponderosa Pine	Pinus	_____	_____
Western Sycamore	_____	racemosa	_____

- 2) Using the attached dichotomous key (Appendix A), find the name of the bush with BLUE flagging. Show your steps for possible partial credit. **(3 points)**

Common name: \_\_\_\_\_ Genus: \_\_\_\_\_ species: \_\_\_\_\_

### Physiology

- 3) Of the trees that are common to the Sierra Nevada Mountains, name two trees you would expect to become more prevalent as you (a) go up in elevation from this site and two trees as you (b) go down in elevation from this site? **(4 points)**

a) Go up in elevation: \_\_\_\_\_

b) Go down in elevation: \_\_\_\_\_

- 4) Circle the letter of the statement that best describes trees considered “shade intolerant”? **(2 points)**

a) Trees that can withstand extreme amounts of water

b) Trees that cannot withstand shade

c) Trees that can withstand insects while in the shade

d) Trees that cannot withstand full sun

- 5) Briefly explain the function of the following parts of a tree. **(6 points)**

a) Outer bark: \_\_\_\_\_

b) Xylem: \_\_\_\_\_

c) Phloem: \_\_\_\_\_

d) Heartwood: \_\_\_\_\_

e) Roots: \_\_\_\_\_

f) Cambium: \_\_\_\_\_

**Mensuration**

6) Define the following: **(4 points)**

- a) A board foot measures \_\_\_\_\_ inch(es) by \_\_\_\_\_ inches \_\_\_\_\_ inches.  
 b) A cubic foot measures \_\_\_\_\_ inch(es) by \_\_\_\_\_ inches \_\_\_\_\_ inches.  
 c) Mbf means: \_\_\_\_\_ d) Ccf means: \_\_\_\_\_

7) Using the 20 BAF prism and standing in the designated spot, determine which tree is “in”, “out”, and “borderline” for the variable diameter plot. **(5 points)**

Blue	In	Out	Borderline	Green/Black	In	Out	Borderline
Orange/White	In	Out	Borderline	Blue/White	In	Out	Borderline
				Red/White	In	Out	Borderline

8) Using the data from Question 7, how much basal area per acre (square feet) is represented by your sample? \_\_\_\_\_ **(1 point)**

9) Using the equipment provided to take the following measurements for the Tree flagged with BLUE/BLACK Flagging and Record your measurement. **(3 points)**

- a) DBH to the nearest 1/10 inch: \_\_\_\_\_  
 b) Total Height: \_\_\_\_\_  
 c) Total number of logs to the top of the tree (round down to whole log): \_\_\_\_\_

10) Using the Scribner’s Net Volume Table (table 1), determine the volume of the BLUE/BLACK flagged tree: (Round to the nearest even 2” diameter class and height down to the 10’ class) **(1 points)**

Volume = \_\_\_\_\_

11) Using the manufactured core sample located at the base of the tree flagged in BLUE/BLACK flagging, determine the age of the tree. Note: the core sample was taken at DBH!!!! (Hint: see question 12) **(2 points)**

Age: \_\_\_\_\_

12) Which is an alternate method foresters sometimes use to determine the age of a young conifer tree without the use of any instruments? **(1 point)**

- a) Counting the growth whorls from the bottom to the top of the tree.  
 b) Estimation by the use of the height and species of the tree.  
 c) Estimation by the diameter and height of the tree.

**Survey and Mapping**

13) Moving to a point 39 feet due south from the tree flagged in ORANGE/WHITE, what are the azimuths to the following trees flagged in: **(2 points)**

a) BLUE: \_\_\_\_\_

b) WHITE: \_\_\_\_\_

14) What is the slope of the hill noted by the two stakes (indicated with slope written on them) south east of the tree flagged in white? \_\_\_\_\_ **(2 points)**

15) How many Sections are there in a township? \_\_\_\_\_ **(2 points)**

How many acres are there in a section? \_\_\_\_\_

16) Using the attached map, how many acres are there in the area labeled: **(4 points)**

A: \_\_\_\_\_

B: \_\_\_\_\_

C: \_\_\_\_\_

D: \_\_\_\_\_

17) Using the attached map, give the full legal description of the Nelder Grove Campground. **(4 points)**

Northwest \_\_\_\_\_

Of Section \_\_\_\_\_

Township \_\_\_\_\_

Range \_\_\_\_\_

Mount Diablo Baseline and Meridian

**Silviculture**

18) What is meant by the terms: even-aged silvicultural system and uneven-aged silvicultural system? **(2 points)**

Even-aged: \_\_\_\_\_  
\_\_\_\_\_

Uneven-aged: \_\_\_\_\_  
\_\_\_\_\_

- 19) Give an example of an even-aged silvicultural system and an example of an uneven-aged silvicultural system. **(2 points)**

Even-aged: \_\_\_\_\_

\_\_\_\_\_

Uneven-aged: \_\_\_\_\_

\_\_\_\_\_

- 20) Forested land can be classified by its productivity. This classification is based on tree height, growth, and age. Use the attached site index table (Appendix , Table 2) and site classification table (Appendix E, Table 3) to determine the site index and site class of a hypothetical pine stand that has an average height of 115 feet at an age of 128 years. **(2 points)**

Site index: \_\_\_\_\_ Site class: \_\_\_\_\_

- 21) Trees in an area that are classified as site class V will grow very slow, while trees in an area that are classified as site class I will grow very vigorously. Based on your answer to question 18 above: (a) What would you say about the productivity of the hypothetical pine stand? (b) Is the land that the stand occupies a good place to grow trees for lumber? **(2 points)**

a) \_\_\_\_\_

b) \_\_\_\_\_

- 22) Thinning forest stands (density management) allows resources, such as light, moisture, and nutrients, to be concentrated on fewer trees, thus allowing healthier and faster growing trees. These trees may also be better situated to withstand root-rot and fire, with better spacing and thicker bark development, in some cases, for fire protection. You are marking an “understory” or “low” thinning or “thinning from below”. Crown classes have been used to describe tree by the amount of light they receive and their position in the canopy. Which trees, by crown position, do you concentrate on marking for logging an understory thinning? **(2 points)**

- a. Dominant and Co-dominant trees
- b. Co-dominant and intermediate trees
- c. Intermediate and suppressed trees

**Forest Protection, Fire and Fuels, Entomology and Pathology**

23) Name the three sides of the fire triangle. **(3 points)**

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

24) Which of the following insect pests does not bore into the bark of trees, but instead lays its eggs on the surface or crevices of the tree and its grubs bore into the tree? Please circle the appropriate response. **(1 point)**

- a) Western pine Beetle
- b) Mountain Pine Beetle
- c) Pine Engraver Beetle
- d) Fir Flathead Borer
- e) Fir Engraver Beetle

**Forest Management**

25) To the southwest of the Forestry station, down by the creek, are a snag and a down log. List benefits and detriments of retaining both below: **(4 points)**

<b>Benefit</b>	<b>Detriment</b>
Snag : _____	_____
Log: _____	_____

26) Name four benefits and four detriments of wildfire. All reasonable answers will be considered. **(8 points)**

<b>Benefits</b>	<b>Detriments</b>
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____

27) List three logging methods to move logs out of the forest, and a benefit and detriment to using each method: **(11 points)**

<b>Method</b>	<b>Benefit</b>	<b>Detriment</b>
a. _____	_____ _____ _____	_____ _____ _____
b. _____	_____ _____ _____	_____ _____ _____
c. _____	_____ _____ _____	_____ _____ _____

28) Invasive plant species are becoming a large problem in California. These species can sometimes “out compete” native species, if given the chance. Name three common management methods currently being utilized by natural resource managers to reduce and eliminate noxious weed introduction and spread: **(3 points)**

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

29) If you were hired as a fire and/or forest manager, list 4 recommendations you would give to a landowner or home owner to maintain a safe environment for residents, while at the same time ensuring the surrounding area stays natural. **(4 points)**

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_

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Table 1  
 REGION 5 SCHEMATIC NET VOLUMES TABLES TO A UTILIZATION TOP  
 NATIONAL CITIES PROGRAM  
 PINE  
 MAY 1996

DISTRICT	MCM																											
	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	
30	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
40	19	29	38	48	58	68	78	88	98	108	118	128	138	148	158	168	178	188	198	208	218	228	238	248	258	268	278	288
50	29	39	49	59	69	79	89	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299
60	39	49	59	69	79	89	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309
70	49	59	69	79	89	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319
80	59	69	79	89	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329
90	69	79	89	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339
100	79	89	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349
110	89	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359
120	99	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369
130	109	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379
140	119	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379	389
150	129	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379	389	399
160	139	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379	389	399	409
170	149	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379	389	399	409	419
180	159	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379	389	399	409	419	429
190	169	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379	389	399	409	419	429	439
200	179	189	199	209	219	229	239	249	259	269	279	289	299	309	319	329	339	349	359	369	379	389	399	409	419	429	439	449



Table 2 - Site Index Values  
 Height of Average Dominant and Codominant  
 Pine at 100 years (USFS, Meyer, 1938)

AGE	HEIGHT BY SITE INDEX											
	50	60	70	80	90	100	110	120	130	140	150	160
20	9	12	16	20	25	30	35	40	45	50	55	60
30	15	20	26	32	38	44	51	57	64	70	77	84
40	22	29	36	42	49	55	63	70	77	85	93	100
50	28	36	43	51	58	66	73	80	88	97	106	113
60	34	42	50	58	66	73	80	89	97	107	115	124
70	38	47	56	64	73	80	89	98	108	118	128	134
80	43	52	61	70	79	88	97	106	116	124	133	143
90	47	57	66	75	85	94	104	113	123	132	142	152
100	50	60	70	80	90	100	110	120	130	140	150	160
110	53	63	74	84	95	105	116	127	137	147	158	168
120	55	66	77	88	100	111	122	133	144	154	165	175
130	57	69	80	92	104	116	128	139	151	161	172	182
140	59	71	83	95	108	121	133	145	157	167	179	189
150	60	73	85	97	112	125	138	151	163	173	185	196
160	61	75	89	102	116	129	143	156	169	179	191	201
170	62	77	91	105	119	133	147	161	174	184	196	207
180	63	78	93	108	122	136	151	164	177	187	200	210
190	63	79	95	110	125	139	154	168	181	191	205	216
200	64	80	97	112	128	143	157	172	185	196	209	220

TABLE 3 - TIMBER SITE CLASSIFICATION SYSTEMS IN CALIFORNIA  
 (CALIFORNIA BOARD OF FORESTRY, CAC 14-1060, 1974)

Young Growth Coast Redwood		Douglas-Fir		Ponderosa Pine	
Site Class	Site Index *	Site Class	Site Index *	Site Class	Site Index *
I.....	180 or more	I.....	194 or more	I.....	114 or more
II.....	155 - 179	II.....	164 - 183	II.....	93 - 113
III.....	130 - 154	III.....	134 - 163	III.....	75 - 92
IV.....	105 - 129	IV.....	103 - 133	IV.....	50 - 74
V.....	Less than 105	V.....	Less than 103	V.....	Less than 50

\* Site index is same as total tree height in feet at 100 years old

Dichotomous Key for the RHAMNACEAE - Buckthorn Family

## CEANOTHUS L.

Habit: Mostly shrubs, occasionally small trees.

Leaves: Simple; deciduous or persistent; alternate (and with 3 prominent veins from the base of the leaf), or opposite; margins entire, serrate, or almost spinose.

Flowers: Complete; individual flowers small but borne in dense clusters; white to blue. The clusters are mostly long panicles or racemes.

Fruits: Small, subglobose, 3-lobed capsule and 3celled, smooth or sticky on the surface.

Remarks: This genus is confined to North America. There are between 50 and 60 species and most of them are limited to the Pacific Coast region. Nitrogen-fixing nodules of bacteria are found on the roots.

KEY TO THE CEANOTHUSES

- |  |                        |
|--|------------------------|
| 1. Leaves opposite.  | 2                      |
| 1. Leaves alternate.   | 3                      |
| 2. Leaves clustered at the nodes; margins mostly entire.                         | <i>C. cuneatus</i>     |
| 2. Leaves not clustered at the nodes; margins with a few, almost-spinose, teeth. | <i>C. prostratus</i>   |
| 3. Younger branches round.   | 4                      |
| 3. Younger branches ribbed.  | <i>C. thyrsiflorus</i> |
| 4. Leaves thick and leathery.  | <i>C. velutinus</i>    |
| 4. Leaves not thick and leathery.  | 5                      |
| 5. Leaf margins smooth.  | <i>C. integerrimus</i> |
| 5. Leaf margins serrate.   | <i>C. sanguineus</i>   |

*CEANOTHUS CUNEATUS* (Hook.) Nutt.  
Wedgeleaf Ceanothus

Narrowleaf buckbrush

Habit: An erect shrub 31 to 81 tall, or small and sprawling and growing in matlike clumps (upper elevational limits).

Leaves: Persistent, most commonly in opposite clusters; 1/411 to 3/411 long, obovate, cuneate, spatulate or oblong elliptical; grayish green, initially minutely hairy but soon becoming glabrous; margins entire or occasionally with 1 or 2 teeth near the apex; apex rounded; base wedge shaped; petiole very short.

Flowers: Small, white, borne in loose clusters.

Fruit: Subglobose capsule, less than 1/411 in diameter, each lobe has a small horn near the apex.

Twigs: Lateral branchlets short, rigid and thornlike; reddish-brown, but superficially light gray. Opposite branching.

Bark: Gray and smooth on younger stems, becoming grayish brown.

Habitat & Range: Found on dry, gravelly or rocky soils; from the central Willamette Valley southward to southern California, locally in extreme western Nevada.

Remarks: A major component of chaparral and brushfields. Narrowleaf buckbrush will not sprout from the roots or root crown following a fire. Heat, however, appears to stimulate the germination of dormant seeds in the soil. It is an important winter browse plant for deer in many localities.

*CEANOTHUS INTEGERRIMUS* Hook.&Arn.

Deerbrush

Habit: An erect, loosely branched shrub 41 to 121 tall.

Leaves: Deciduous (occasionally semi-persistent), alternate, 112 to 31' long and about half as broad, ovate, elliptical to ovate -elliptical; margins smooth-, green to dark green and smooth above, paler and glabrous or sparsely pubescent on the underside; 3 prominent veins from the base of the leaf; petiole about 1/211 long.

Flowers: Small, white (sometimes blue or Pinkish); borne in long terminal or axillary clusters.

Fruit: Round to round -triangular, sticky capsule; each lobe has a slight crest or ridge down the side.

Twigs: Round, slender, frequently arching, green to tannish green, often with warty areas on the older branches.

Habitat & Range: Grows on many types of soil, but does best where the soil is moderately fertile and well-drained; from eastern Washington southward through California, and eastward into western Nevada and Arizona.

Remarks: The Range Plant Handbook reports, "Deer-brush is one of the most valuable browse plants of the West and in California it provides more forage than any other browse species. Deerbrush is so important in the Sierras and southern Cascades that

management of many ranges is based on its growth requirements. It is considered a good to excellent browse for .....deer."

*CEANOTHUS PROSTRATUS* Benth  
Mahala Mat

Squawcarpet

Twigs: Lateral twigs usually not over 6" long, or commonly spur-like; new twigs reddish to reddish brown, initially hairy but becoming smooth.

Habit: A low, prostrate, evergreen shrub with leathery, holly -like leaves and creeping branches which frequently take root at the nodes. Older plants may form a dense carpet-like mat up to 101 across.

Leaves: Persistent, opposite, thick and leathery; 1/41, to 1" long, spatulate, cuneate, obovate or obovate -elliptical; dark green glabrous and lustrous above, paler or grayish-green beneath; sparse, almost-spinose teeth along the upper margin, entire below; base wedge-shaped; petiole very short.

Flowers: Small, blue, borne in loose terminal clusters.

Fruit: Subglobose capsule about 1/411 broad, each lobe with a wrinkled, dorsal horn or boss.

Habitat & Range: On dry sites in the sun; in the Cascade Mountains from Washington southward into northern California, eastward into Idaho and Nevada.

*CEANOTHUS THYRSIFLORUS* Esch.  
Blueblossom

Habit: Erect shrubs up to 121 in height, or small trees up to 201 tall; on exposed situations it may be lowgrowing to prostrate.

Leaves: Persistent; alternate; simple; but smaller leaves are often clustered about the base of the principal leaf; 3/4" to 211 long, oblong-ovate to elliptical; dark glossy green above, paler and commonly smooth below; margins finely serrate and at times revolute (occasionally entire); prominently 3 -veined f rom the base; petiole less than 1/2 11 long.

Flowers: Small, blue (rarely white), borne in dense clusters up to 3" long.

Fruit: Subglobose capsule about 1/6" in diameter, black and somewhat sticky.

Twigs: Slender, green, distinctly ribbed for the first 2 or 3 years.

Habitat & Rang: Found on dry, well-drained sites in the sun or shade; from Douglas County in western Oregon southward to southern California.

Remarks: Blueblossom is one of the largest and hardiest of the ceanothus. It forms dense thickets following a fire; a pioneer species on cut-over lands and along new road cuts. Planted as an ornamental.

*CEANOETHUS SANGUINEUS*  
Redstem Ceanothus

PurshBuckbrush

Habit: An erect, loosely branched shrub 51 to 101 tall, with moderately slender, purplish red stems.

Remarks: Found in mixed-conifer or ponderosa piDe stands. Squaw carpet provides some protection against soil erosion and may act as a nursecrop for coniferous reproduction. Forage value low.

Flowers: Small, white md borne in dense cluster up to 411 long.

Fruit: Subglobose capsule up to 3/1611 in diameter, lobes smooth except for an inconspicuous ridge.

Twigs: Slender, purplish-red; smooth. Buds often stalked.

Habitat & Ran : Found on dry to moist, well-drained sites in the sun or partial shade; from southern British Columbia southward to northern California, eastward to Idaho and Montana.

Remarks: Fairly palatable to big game animals.

*CEANOETHUS VELUTINUS* Dougl.  
Snowbrush

Habit: Evergreen shrub 21 to 101 tall with light green stems; often thicket forming.

Leaves: Persistent, alternate, thick and leathery, 1-17211 to 2-1/2" long, broadly ovate to ovate elliptical; dark glossy green (sticky during warm weather) above; underside pale green and at first slightly tomentose, but soon becoming smooth; margins finely serrate; 3 prominent veins from the base of the leaf; petiole 1/211 to 3/411 long. The foliage has a sickening-sweet odor when rubbed or during very warm weather.

Flowers: Small, white, borne in dense clusters 211 to 511 long.

Twigs: Stout, smooth, light green; larger stems green.

Habitat & Range: Found on a wide variety of sites and exposures; from British Columbia and Saskatchewan southward through western United States. It is quite likely that snowbrush has the most extensive range of the ceanothus.

Remarks: Snowbrush frequently invades cutover and burned-over lands. Seeds retain their viability for several years. If root crown is not killed by fire, its crown sprouts abundantly. Fire also appears to stimulate germination of the undamaged seed.

Snowbrush often forms extensive thickets or fields. if the plants are not too dense they may serve as an excellent nurse crop for Douglas-fir. In many cases, especially in portions of the ponderosa pine region, the brush is so dense as to preclude re-generation.

It is a poor forage for wildlife. Deer frequently bed in the thickets and may crop the foliage during all seasons. In eastern Oregon, abundant snowbrush indicates enough soil moisture to support Douglas fir.