

# WHITE FIR SERIES

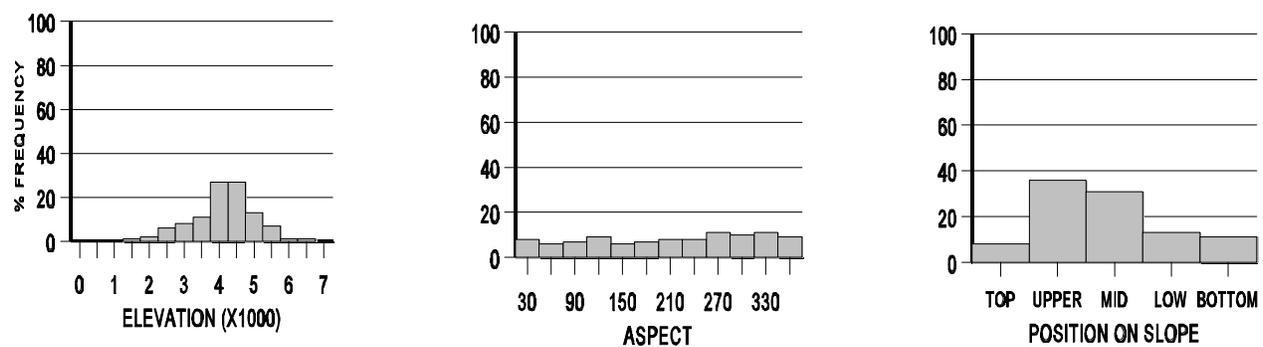
*Abies concolor*

## ABCO

Diane E. White

As a species, white fir is abundant in southwestern Oregon. On the west side of the Cascade Mountains, southwestern Oregon is the approximate northern extent. White fir extends south throughout California. Grand fir (*Abies grandis*) also occurs in the area, but it interbreeds with white fir and is difficult to distinguish. Zobel (1973, 1974) has described a zone of morphological and physiological intergradation between the two species. The overlap occurs in a diagonal band extending from the Klamath Mountain Province (northwest California and southwest Oregon) through the southern Oregon Cascades into the Blue Mountains (northeast Oregon and west-central Idaho). Individuals exhibiting characteristics of both species are often referred to as *Abies grandicolor* (sic). All references in this guide will be to white fir (*A. concolor*), although some individuals in the field may exhibit more grand fir characteristics. The ecological and silvicultural differences are not significant enough to warrant any distinctions within the context of this guide.

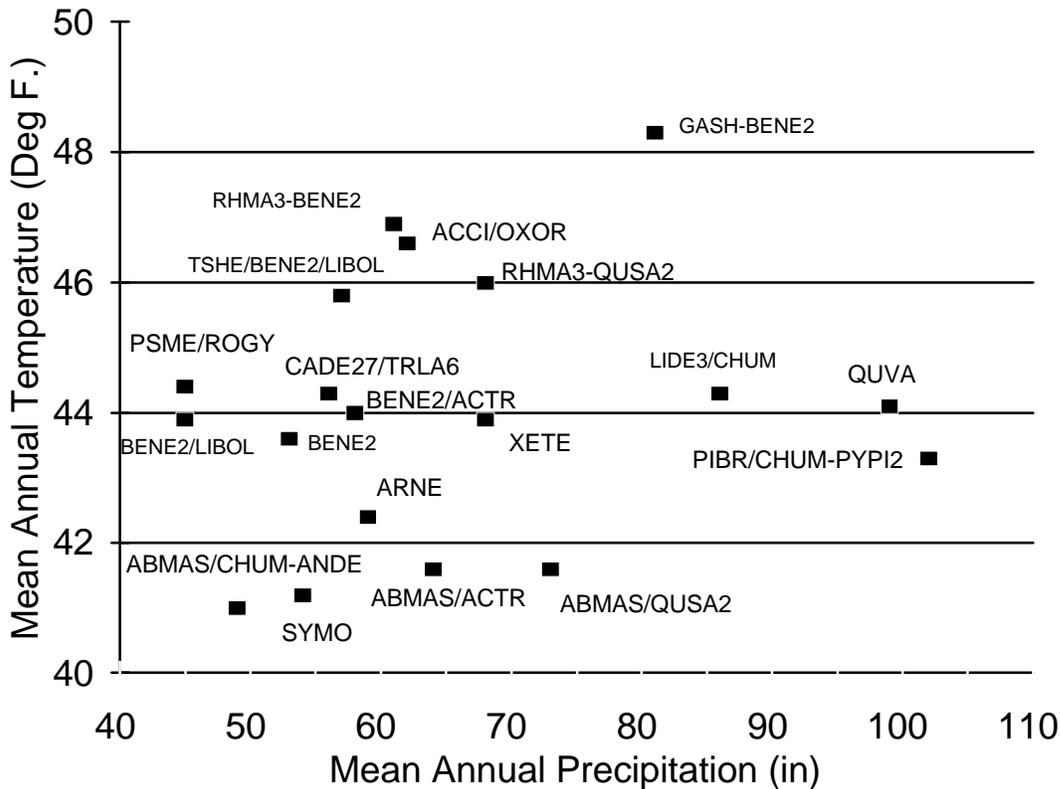
The White Fir Series occurs on environmentally varied sites throughout southwestern Oregon. It covers a wide elevational band, with an average of approximately 4300 feet. The Series occurs evenly across all aspects, and upper and middle slope positions are more common than ridge tops or bottoms. The Series includes highly productive lands, and has a high vascular plant species diversity.



Many different soils occur in the White Fir Series. Parent material is variable, although occurrence on diorite is frequent. Soils range from shallow to deep, although moderately deep to deep are the most frequently encountered conditions. Surface textures range from sand, sandy loam, loam, and loamy sand to sandy clay loam, silt loam, and clay loam. Rock fragments range from 15 to 70 percent, and clay content ranges from 5 to 26 percent. Subsurface textures range from sand, sandy loam, loam, and loamy sand, through sandy clay loam and clay loam. Rock fragments are between 10 and 75 percent, and clay content ranges between 0 and 50 percent. Soil data were collected on all plots, with a sub-sample of 75 intensively described soil pits.

The White Fir Series generally occurs on cool sites. Average annual temperature ranges from 41 degrees F in the High Cascades and Siskiyou to 48 degrees F in lower elevation areas. Average annual rainfall varies between 45 inches in drier areas of the Cascades to 102 inches near the coast.

The relative environments of the plant associations are shown below. Each association is plotted by mean annual temperature and mean annual precipitation.



As a result of the frequent disturbance in southwestern Oregon, Douglas-fir, an early seral species, is the dominant overstory tree in the White Fir Series. In colder areas, Shasta red fir may be the dominant overstory pioneer species. White fir is the dominant tree species in the understory, and is particularly abundant in older stands with a low frequency of disturbance. In wetter areas of the Cascades and Siskiyou, western hemlock is present, and on higher elevation, cooler areas, Pacific silver fir, mountain hemlock, Shasta red fir, and lodgepole pine may be present. In cold, dry areas of the Siskiyou, Brewer spruce may be part of the stand. In the Siskiyou tanoak may be present, and in areas that tend toward ultramafic soils, Port-Orford-cedar may be common. Dwarf Oregongrape and common prince's-pine are widespread throughout the Series. Pacific rhododendron and salal are common in moist, high productivity areas. Incense-cedar, golden chinquapin, ponderosa pine, and whipplevine are present on dry sites.

Average total vascular plant species richness for the White Fir Series ranges between 19 and 44. In this Series, richness is rated as very low, less than or equal to 20 species; low, 21 to 29 species; intermediate, 30 to 35 species; high, 36 to 41 species; and very high, greater than 41 species.

Upper layer tree canopy cover ranges from 55 percent in the White Fir-Shasta Red Fir/Vanillaleaf Association, to 78 percent in the White Fir/Pacific Rhododendron-Sadler Oak Association. The mid-layer tree cover ranges between 33 and 63 percent. The lower layer tree cover ranges between 8 and 68 percent. High shrub cover ranges between 1 and 60 percent, and low shrub cover ranges between 2 and 55 percent. Herb/grass cover ranges between 10 and 98 percent.

Nineteen plant associations have been classified for the Series in southwestern Oregon. They were described from 521 plots; 454 from Forest Service and 67 from Bureau of Land Management lands.

The flow chart on the following pages shows a graphical presentation of the classification and the relationships between the plant associations.

#### LITERATURE CITED

Zobel, D. B. 1973. Local variation in intergrading *Abies grandis*-*Abies concolor* populations in the central Oregon Cascades. I. Needle morphology and periderm color. *Botanical Gazette* 134(3):209-220.

Zobel, D. B. 1974. Local variation in intergrading *Abies grandis*-*Abies concolor* populations in the central Oregon Cascades. II. Stomatal reaction to moisture stress. *Botanical Gazette* 135(2):200-210.





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The relationship of draft and final plant associations in the White Fir Series is shown below. The draft associations are listed, with the final associations below each, in order of most to least common, with the percentage of plots that make up each association (refer to Methods section).

ABCO-ABAM/BENE (N=3)  
ABCO-CADE27/TRLA6 (33%)  
ABCO/BENE2 (33%)  
ABCO/BENE2/ACTR (33%)

ABCO-ABMAS/CHUM (N=25)  
ABCO-ABMAS/CHUM-ANDE3 (40%)  
ABCO-ABMAS/ACTR (24%)  
ABCO/BENE2 (12%)  
ABCO/BENE2/LIBOL (8%)  
ABCO/RHMA3-BENE2 (4%)  
ABCO/SYMO (4%)  
ABMAS/VAME/CHUM (4%)  
TSME/RHMA3/XETE (4%)

ABCO-ABMAS/RIBES (N=6)  
ABCO-ABMAS/ACTR (83%)  
ABCO-CADE27/TRLA6 (17%)

ABCO-ABMAS/ROGY (N=10)  
ABCO-ABMAS/QUSA2 (40%)  
ABCO-ABMAS/ACTR (20%)  
ABCO/BENE2/ACTR (20%)  
ABCO-ABMAS/CHUM-ANDE3 (10%)  
ABMAS-ABCO/ROGY/PYSE (10%)

ABCO-ABMAS/SYMO (N=15)  
ABCO-ABMAS/CHUM-ANDE3 (60%)  
ABCO-ABMAS/QUSA2 (13%)  
ABCO-CADE27/TRLA6 (13%)  
ABCO/BENE2 (7%)  
ABCO/SYMO (7%)

ABCO/ACCI/ACTR (N=19)  
ABCO/BENE2/ACTR (40%)  
ABCO/BENE2 (16%)  
ABCO-TSHE/BENE2/LIBOL (10%)  
ABCO/BENE2/LIBOL (10%)  
ABCO/RHMA3-BENE2 (10%)  
ABCO-CADE27/TRLA6 (5%)  
ABCO-PSME/ROGY (5%)  
ABCO/ACCI/OXOR (5%)  
PSME/ACCI-BENE2 (5%)

ABCO-ACGL (N=4)  
ABCO/BENE2 (50%)  
ABCO-CADE27/TRLA6 (25%)  
ABCO/SYMO (25%)

ABCO-ACGL/BENE (N=7)  
ABCO-CADE27/TRLA6 (43%)  
ABCO/BENE2 (43%)  
ABCO/BENE2/LIBOL (14%)

ABCO-CHLA/DEPAUPERATE (N=3)  
ABCO/BENE2/ACTR (33%)  
CHLA-ABCO/BENE2 (33%)  
PSME-ABCO (33%)

ABCO-CHNO (N=1)  
ABCO-ABMAS/ACTR (100%)

ABCO-CADE3/BENE (N=15)  
ABCO-CADE27/TRLA6 (43%)  
ABCO-TSHE/BENE2/LIBOL (21%)  
ABCO/BENE2/LIBOL (14%)  
ABCO/BENE2/ACTR (7%)  
ABCO/BENE2 (7%)  
TSHE-ABCO/ACCI-BENE2 (7%)

ABCO-LIDE3 (N=19)  
ABCO-LIDE3/CHUM (45%)  
ABCO/BENE2 (14%)  
ABCO/ARNE (9%)  
PSME-ABCO (9%)  
ABCO/QUVA (9%)  
ABCO-PSME/ROGY (5%)  
LIDE3-PSME-QUCH2/BENE2 (5%)  
LIDE3-PSME-QUCH2/RHDI6 (5%)

ABCO-PIBR/CHUM (N=9)  
ABCO-PIBR/CHUM-PYPI2 (44%)  
ABCO/QUVA (22%)  
ABCO-LIDE3/CHUM (11%)  
CHLA/QUVA/XETE (11%)  
PSME/ARNE-SWO (11%)

ABCO-PIBR/GAOV (N=8)  
 ABCO-PIBR/CHUM-PYPI2 (25%)  
 ABCO/QUVA (25%)  
 ABCO-ABMAS/QUSA2 (13%)  
 ABCO-LIDE3/CHUM (13%)  
 ABCO/BENE2/ACTR (13%)  
 ABMAS-ABCO/QUSA2/CHUM (13%)

ABCO-PIBR/VAME (N=7)  
 ABCO-PIBR/CHUM-PYPI2 (57%)  
 ABCO-ABMAS/QUSA2 (14%)  
 ABCO-LIDE3/CHUM (14%)  
 TSME-ABMAS/VAME/CHUM (14%)

ABCO-PICO/AMAL (N=3)  
 ABCO-ABMAS/CHUM-ANDE3 (33%)  
 ABCO/BENE2 (33%)  
 ABMAS-PICO/ARNE/CHUM (33%)

ABCO-PIPO (N=3)  
 ABCO-CADE27/TRLA6 (33%)  
 ABCO-PSME/ROGY (33%)  
 ABCO/SYMO (33%)

ABCO-PSME (N=37)  
 ABCO/BENE2 (38%)  
 ABCO-PSME/ROGY (22%)  
 ABCO/BENE2/ACTR (11%)  
 ABCO-TSHE/BENE2/LIBOL (5%)  
 ABCO/BENE2/LIBOL (5%)  
 ABCO/SYMO (5%)  
 ABCO/XETE (5%)  
 ABCO-CADE27/TRLA6 (3%)  
 PSME-ABCO (3%)

ABCO-PSME/BENE (N=10)  
 ABCO/BENE2 (50%)  
 ABCO-LIDE3/CHUM (10%)  
 ABCO-PIBR/CHUM-PYPI2 (10%)  
 ABCO/ARNE (10%)  
 ABCO/BENE2/LIBOL (10%)  
 LIDE3-PSME-QUCH2/BENE2 (10%)

ABCO-PSME/BEPI (N=13)  
 ABCO-CADE27/TRLA6 (38%)  
 ABCO/BENE2 (31%)  
 ABCO-PSME/ROGY (8%)  
 ABCO-TSHE/BENE2/LIBOL (8%)  
 PSME-ABCO (8%)  
 PSME-CADE27/BEPI2 (8%)

ABCO-PSME/DEPAUPERATE (N=4)  
 ABCO/SYMO (50%)  
 ABCO-PSME/ROGY (25%)  
 ABCO/ARNE (25%)

ABCO-PSME/HODI (N=23)  
 ABCO/BENE2 (45%)  
 ABCO-PSME/ROGY (23%)  
 ABCO/SYMO (18%)  
 ABCO/BENE2/ACTR (4%)  
 PSME-ABCO/SYMO (4%)  
 PSME-PIPO/RHDI6 (4%)

ABCO-QUSA-CACH (N=8)  
 ABCO-PSME/ROGY (38%)  
 ABCO/BENE2 (25%)  
 ABCO/QUVA (25%)  
 ABCO/SYMO (12%)

ABCO-QUSA/BENE (N=8)  
 ABCO/BENE2 (38%)  
 ABCO-CADE27/TRLA6 (25%)  
 ABCO-LIDE3/CHUM (25%)  
 ABCO-PSME/ROGY (13%)

ABCO-QUSA/BENE-PAMY (N=14)  
 ABCO/BENE2/ACTR (50%)  
 ABCO/BENE2 (21%)  
 ABCO-CADE27/TRLA6 (14%)  
 CHLA-ABCO/BENE2 (7%)  
 PSME-CACH6/BENE2 (7%)

ABCO-QUSA/CHUM (N=4)  
 ABCO-ABMAS/QUSA2 (75%)  
 ABCO-ABMAS/ACTR (25%)

ABCO-TABR (N=8)  
 ABCO/BENE2/ACTR (50%)  
 ABCO/BENE2/LIBOL (38%)  
 ABCO-TSHE/BENE2/LIBOL (12%)

ABCO-TSHE-ACCI (N=2)  
 ABCO-TSHE/BENE2/LIBOL (50%)  
 ABCO/BENE2 (50%)

ABCO-TSME/VAME (N=1)  
 ABCO-TSHE/BENE2/LIBOL (100%)

ABCO/AMAL/ANDE (N=7)  
 ABCO/BENE2 (57%)  
 ABCO/BENE2/LIBOL (29%)  
 PSME-ABCO (14%)

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### ABCO/BENE (N=17)

ABCO-PSME/ROGY (29%)  
ABCO/BENE2/ACTR (36%)  
ABCO/BENE2 (14%)  
ABCO-LIDE3/CHUM (7%)  
ABCO-TSHE/BENE2/LIBOL (7%)  
ABCO/BENE2/LIBOL (7%)

### ABCO/BENE-GASH (N=21)

ABCO/RHMA3-BENE2 (71%)  
ABCO/GASH-BENE2 (24%)  
PSME/GASH-BENE2 (5%)

### ABCO/BENE/ANDE (N=3)

ABCO/BENE2 (100%)

### ABCO/CHUM/PYROLA (N=1)

ABCO/BENE2/ACTR (100%)

### ABCO/COCOC-AMAL (N=3)

ABCO-CADE27/TRLA6 (33%)  
ABCO-PSME/ROGY (33%)  
PSME-ABCO/SYMO (33%)

### ABCO/HERB (N=10)

ABCO/BENE2/ACTR (30%)  
ABCO/BENE2/LIBOL (20%)  
ABCO-ABMAS/ACTR (20%)  
ABCO-PSME/ROGY (10%)  
ABCO/ARNE (10%)  
ABCO/BENE2 (10%)

### ABCO/RHDI (N=4)

ABCO/GASH-BENE2 (50%)  
ABCO/BENE2 (25%)  
ABCO-TSHE/BENE2/LIBOL (25%)

### ABCO/RUNI/ACTR (N=14)

ABCO-TSHE/BENE2/LIBOL (36%)  
ABCO/BENE2/ACTR (29%)  
ABCO/BENE2/LIBOL (14%)  
ABCO/BENE2 (7%)  
ABCO-CADE27/TRLA6 (7%)  
PSME-ABCO (7%)

### ABCO/SYMO (N=11)

ABCO/BENE2 (35%)  
ABCO/BENE2/ACTR (17%)  
ABCO-ABMAS/CHUM-ANDE3 (17%)  
ABCO-PSME/ROGY (16%)  
ABCO/SYMO (8%)  
ABCO/BENE2/LIBOL (8%)

### ABCO/VAME/ACTR (N=6)

ABCO-TSHE/BENE2/LIBOL (67%)  
ABCO/BENE2/ACTR (17%)  
ABCO/RHMA3-BENE2 (17%)

### ABCO/VAME/LIBOL (N=10)

ABCO/BENE2/LIBOL (70%)  
ABCO/BENE2 (20%)  
ABCO/BENE2/ACTR (10%)

KEY TO THE WHITE FIR PLANT ASSOCIATIONS

- 1a. White fir (ABCO) and Shasta red fir (ABMAS) dominant in the overstory. Douglas-fir (PSME) with low cover in the overstory. Elevation over 4700 feet. 2
  
- 1b. Douglas-fir (PSME) overstory cover higher than white fir (ABCO) or Shasta red fir (ABMAS). Elevation less than 4700 feet. 5
  
- 2a. Sadler oak (QUSA2) present. ABCO-ABMAS/QUSA2  
Page ABCO 12
  
- 2b. Sadler oak (QUSA2) absent. 3
  
- 3a. Vanillaleaf (ACTR) present. ABCO-ABMAS/ACTR  
Page ABCO 14
  
- 3b. Vanillaleaf (ACTR) absent. 4
  
- 4a. Common beargrass (XETE) greater than or equal to 10 percent cover. ABCO/XETE  
Page ABCO 16
  
- 4b. Common beargrass (XETE) less than 10 percent cover. ABCO-ABMAS/CHUM-ANDE3  
Page ABCO 18
  
- 5a. Shasta red fir (ABMAS) regeneration greater than 1 percent cover. 6
  
- 5b. Shasta red fir (ABMAS) regeneration less than or equal to 1 percent cover. 8
  
- 6a. Huckleberry oak (QUVA) greater than or equal to 10 percent cover. ABCO/QUVA  
Page ABCO 20
  
- 6b. Huckleberry oak (QUVA) less than 10 percent cover. 7
  
- 7a. Brewer spruce (PIBR) regeneration present. ABCO-PIBR/CHUM-PYPI2  
Page ABCO 22
  
- 7b. Not as above. See ABMAS key

ABCO 10

- 8a. Pinemat manzanita (ARNE) greater than or equal to 5 percent cover. ABCO/ARNE  
Page ABCO 24
- 8b. Pinemat manzanita (ARNE) less than 5 percent cover. 9
- 9a. Huckleberry oak (QUVA) greater than or equal to 10 percent cover. ABCO/QUVA  
Page ABCO 20
- 9b. Huckleberry oak (QUVA) less than 10 percent cover 10
- 10a. Tanoak (LIDE3), little prince's-pine (CHME), and common prince's-pine (CHUM) present ABCO-LIDE3/CHUM  
Page ABCO 26
- 10b. Not as above. 11
- 11a. Common beargrass (XETE) greater than or equal to 10 percent cover. ABCO/XETE  
Page ABCO 16
- 11b. Common beargrass (XETE) less than 10 percent cover. 12
- 12a. Western hemlock (TSHE) regeneration at least 5 percent cover, or salal (GASH) at least 2 percent cover, or Pacific rhododendron (RHMA3) at least 2 percent cover. 13
- 12b. Not as above. 16
- 13a. Salal (GASH) or Pacific rhododendron (RHMA3) greater than or equal to 5 percent cover. 14
- 13b. Not as above. 15
- 14a. Pacific rhododendron (RHMA3) present and Sadler oak (QUSA2) absent. ABCO/RHMA3-BENE2  
Page ABCO 28
- 14b. Pacific rhododendron (RHMA3) present and Sadler oak (QUSA2) present. ABCO/RHMA3-QUSA2  
Page ABCO 30
- 14c. Pacific rhododendron (RHMA3) absent. ABCO/GASH-BENE2  
Page ABCO 32

15a. Oregon oxalis (OXOR) present.	ABCO/ACCI/OXOR Page ABCO 34	
15b. Oregon oxalis (OXOR) absent and Sadler oak (QUSA2) absent.	ABCO-TSHE/BENE2/LIBOL Page ABCO 36	
15c. Oregon oxalis (OXOR) absent and Sadler oak (QUSA2) present.	ABCO/RHMA3-QUSA2 Page ABCO 30	
16a. Vanillaleaf (ACTR) greater than or equal to 10 percent cover.	ABCO/BENE2/ACTR Page ABCO 38	
16b. Vanillaleaf (ACTR) with less than 10 percent cover.		17
17a. Western twinflower (LIBOL) greater than or equal to 10 percent cover.	ABCO/BENE2/LIBOL Page ABCO 40	
17b. Western twinflower (LIBOL) less than 10 percent cover.		18
18a. Canyon live oak (QUCH2) greater than 2 percent cover, or Pacific madrone (ARME) greater than 5 percent cover, or creambush ocean-spray (HODI) greater than or equal to 10 percent cover.	ABCO-PSME/ROGY Page ABCO 42	
18b. Not as above.		19
19a. Incense-cedar (CADE27) regeneration greater than or equal to 2 percent cover.	ABCO-CADE27/TRLA6 Page ABCO 44	
19b. Incense-cedar (CADE27) regeneration less than 2 percent cover.		20
20a. Dwarf Oregongrape (BENE2) present.	ABCO/BENE2 Page ABCO 46	
20b. Dwarf Oregongrape (BENE2) absent.	ABCO/SYMO Page ABCO 48	