UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CALIFORNIA FOREST & RANGE EXPERIMENT STATION

ADDRESS REPLY TO
DIRECTOR
AND REFER TO

UNIVERSITY OF CALIFORNIA
331 GIANNINI HALL
BERKELEY, CALIFORNIA

RR
ARTIFICIAL REVEGETATION
Bitterbrush

March 4, 1944

MEMORANDUM FOR EASTSIDE NATIONAL FORESTS

I thought the eastside forests would be interested in the results of the reseeding trials made with bitterbrush last spring on 14 different areas. As you know, these tests were made with stratified seed. In my letter of July 3 I reported on germination. Germination and survival are shown now in the attached table. A column is included showing the survival of seedlings that germinated in rodent caches during the year. This serves as a check and indicates the influence of the season on the survival of natural and planted seedlings.

In my earlier letter it was indicated that the greatest possible germination of the planted seeds was not obtained primarily because of deep planting and late planting. The seeds that were planted too deep failed to come out of the ground or did not emerge enough for normal growth. Late planting subjected many of the seeds and seedlings to low soil moisture, preventing their germination or ultimate survival.

Soil moisture and seedling survival are directly related. Soil moisture is determined largely by rainfall and the moisture-holding capacity of the soil. The complete mortality of the seedlings on the Wildason Burn, Robinson Creek, Clear Creek Summit, and Airport Burn areas is attributed to low soil moisture at time of planting, soils of low moisture-holding capacity, and drying weather after planting. On the other hand the relatively high survival on the Dog Valley, Bunchgrass Valley, and Lava Beds Mountain areas is attributed to soils of fairly high moisture-holding capacity and appreciable timely precipitation after planting. The survival of seedlings was high in most of the rodent caches observed, indicating that adverse weather was not the primary cause of the high mortality in planted seedlings. The lower rate of survival in planted seedlings was due mainly to faulty techniques in planting and wrong time of planting. Of the planted seedlings that died about 25 percent were killed by rodents and insects; the remaining 75 percent died from lack of soil moisture.

Although these experimental results are somewhat fragmentary they show, as might be expected, that fall planting of seed should give the best results. Where spring planting is desirable or necessary it should be undertaken with stratified seeds early in the spring just as the snow leaves the ground. Laboratory and other experiments carried on during the past year indicate

that satisfactory germination of bitterbrush should also be obtained in the field with unstratified seed if planted in early spring. The seeds should become stratified by temperatures that prevail at that time. The best depth of planting now appears to be between 1/4 inch and 1 inch.

I hope that rangers on the eastside forests will have time to put in a staked series of seed spots this spring - 100 spots of stratified seeds and another 100 of unstratified seeds. One hundred rodent caches should also be staked as checks. This should prove valuable training and experience. Of the important species in the eastside region, bitterbrush holds most promise for sowing on the range on a grand scale. A practical large-scale method of reseeding bitterbrush awaits development by an energetic ranger.

A. L. Hormay

A. L. HORMAY, Assoc. Forest Ecologist

March 3, 1944

Germination and survival of spring- and fall-planted bitterbrush

Forest and planting area	Spring planting 1943 (Stratified seed used)					Fall planting 1942 1/			Vegetation type 2/	Soil 3/
	Date of planting	Spots 4/ planted	Germination	Survival Date	Survival Percent	Caches	Survival Date	Survival Percent		
		Number	Percent			Number				
Inyo National Forest										
1. Wildason Sawmill	May 5	100	60	Oct. 9	0	39	Oct. 9	54	JP,Pt (burned)	Lava FL
" "	-	-	-	-	-	50	Oct. 9	30	JP, Pt	" "
Mono National Forest										
2. Robinson Creek	May 7	100	13	July 27	0	23	July 27	83	ARt, Pt	Granite CSL
3. Clear Creek Summit	May 8	100	50	Oct.	0	Some	Oct.	Few	JP,Pt,ARt	" "
4. Dog Valley	May 9	100	76	Aug. 13	45	-	Aug. 13	-	JP,WF,Ap	Lava FL
Tahoe National Forest										
5. Airport Burn	May 10	50	54	Nov. 18	0	-	Nov. 18	-	JP,Pt, (burned)	Lava FL
6. Airport	May 10	50	40	Nov. 18	8	8	Nov. 18	90	JP,Pt	" FL
Lassen National Forest										
7. Dry Lake	May 11	50	38	Oct. 14	8	-	-	-	So, denuded ARt	Lava SL
8. Bunchgrass Valley	May 12	50	74	Oct. 16	46	-	-	-	So, denuded meadow	" SL
9. Bear Wallow Mtn.	May 12	25	52	-	-	50	-	86	JP,WF,Pt	Granite FSL
Modoc National Forest										
10. Blue Mtn.	May 13	50	20	-	-	35	-	-	Jo,Pt,ARt	Lava SL
11. Smith Sale Burn	May 13	50	60	Oct. 11	16	-	-	-	PP,ARt,Pt	" FL
12. Dry Lake	May 14	100	84	Dec. 24	13	-	-	-	Bt,Jo	" CP
13. Lava Beds Mtn.	May 14	25	88	Dec. 24	40	-	-	-	Jo,ARt,Pt	" CP
Shasta National Forest										
14. Mt. Hebron	May 15	50	70	Oct. 13	32	37	Oct. 13	95	JP,ARt,Pt	" FSL

1/ These seeds were cached by rodents. Some of the clusters of seedlings originating in these caches were staked in early spring and observed for survival during the summer.

2/ Symbols: JP = Jeffrey pine; Pt = Purshia tridentata; So = Stipa occidentalis; WF = White fir; Ap = Arctostaphylos patula; Bt = Bromus tectorum; Jo = Juniper occidentalis; ARt = Artemisia tridentata

3/ Symbols: F = fine, C = coarse, S = sandy, L = loam, P = pumice.

4/ Each spot contained from 4 to about 15 seeds.