OLYMPIC NATIONAL PARK
Hurricane Ridge Road Project

2004 Annual Report Summary
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NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS PLANT MATERIALS CENTER
CORVALLIS, OREGON

INTRODUCTION- The Corvallis Plant Materials Center (PMC) entered into a new agreement with Olympic National Park in 2004 to provide native plant materials for revegetation of Hurricane Ridge Road. It was agreed that the PMC would propagate a minimum of 255 lbs (PLS) of two lower elevation grasses, 100 lbs (PLS) of two upper elevation grasses, and 45 lbs of three upper elevation forbs. The PMC is also responsible for collecting a minimum of 3.5 lbs of seed of four native forbs.
Project is expected to be completed in 2007.

ACCOMPLISHMENTS- PMC staff collected 5.6 lbs of seed of six species (seven accessions). The seed was cleaned and germination tests were performed prior to sowing. Four grass fields (two blue wildrye fields, Columbia brome and sitka brome) and one forb field (broadleaf lupine) were seeded in early October. White sage seed was sown into cone-tainers in fall of 2004 and the resulting plants will be transplanted out into a seed increase field in 2005. Seed collection will be performed again in 2005 and these fields will be expanded.

TECHNOLOGY DEVELOPMENTS- Lupine species are difficult to harvest efficiently due to their indeterminant ripening and easily shattering pods. To aid in seed collection, 2ft-wide strips of weed fabric were tacked down between the rows of lupine to control weeds and to act as a passive seed collector. Seeds can be swept from the weed fabric as the seeds shatter.

Initial germination test results for sitka brome were very low. Seed appeared to be viable, so trials were performed. Seeds were placed in plastic germination boxes on moistened germination paper and stored in a walk-in cooler for 60 and 90 days each. One “control” box of seeds was left in a greenhouse set at fall temperatures (60 degree days, 50 degree nights). The control boxes exhibited 16% germination (after 6 weeks), while boxes that were left in the cooler for 60 and 90 days had 75% and 90% germination, respectively. These findings suggest that this high elevation (4000-5000ft) ecotype has a physiological dormancy.

THE 2004 OLYMPIC NATIONAL PARK ANNUAL REPORT:
Hurricane Ridge Road Revegation Project

CORVALLIS PLANT MATERIALS CENTER
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS, OREGON
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I. Brief Background of Project

The Corvallis Plant Materials Center (PMC) entered into a new agreement with Olympic National Park in 2004 to provide native plant materials for revegetation of Hurricane Ridge Road. It was agreed that the PMC would propagate a minimum of 255 lbs (PLS) of two lower elevation grasses, 100lbs (PLS) of two upper elevation grasses, 45lbs of three upper elevation forbs. The PMC is also responsible for collecting a minimum of 3.5 lbs of seed of four native forbs.

Activities in 2004 included collecting seed of six species (seven accessions), cleaning of native seed collected by PMC staff; establishment and maintenance of seed production fields including three grasses, and three forbs; containerized stock production, and experimental propagation of one grass. Details are provided below.

II. Accessions Involved

Table 1. Accessions involved for Hurricane Ridge Cooperative Agreement at the Corvallis Plant Materials Center.

Species	Common Name	Symbol	Accession Number
Elymus glaucus (high elevation)	blue wildrye	ELGL	9079356
Elymus glaucus (low elevation)	blue wildrye	ELGL	9079352
Bromus sitchensis (high elevation)	Alaska Brome	BRSI	9079357
Bromus vulgaris (low elevation)	Columbia bromegrass	BRVU	9079353
Eriophyllum lanatum	common woolly sunflower	ERLA6	9079358
Lupinus latifolius	broadleaf lupine	LULA4	9079351
Artemisia ludoviciana	Louisiana sage (white sagebrush)	ARLU	9079359
Achillea millefolium	common yarrow	ACMI2	
Anaphalis margaritacea	pearly everlasting	ANMA	
Heracleum maximum	common cow parsnip	HEMA80	
Chamerion angustifolium	fireweed	CHAN9	

III. Native Seed and Plant Collections

PMC staff was responsible for native seed collections. Seed collections were performed primarily along the roadsides of Hurricane Ridge Road. The high elevation collection area was defined by park staff as the area south of the Visitor Center parking lot down Hurricane Ridge Rd to the Switchbacks trailhead parking area. The low elevation collection are was defined by park staff as the "double parking area" down to the intersection of Hurricane Ridge Rd and Race St. Approximately 44 hours were recorded as actual collection time. A total of 5.6 lbs of clean seed of six species was collected in 2004.

Optimum collection times for seed of the lower elevation grasses were mid to late August, depending on sun exposure. Higher elevation grass seed displayed a much narrower collection window. They were not mature until late August and snow fell in early September. Forb seed was mostly collected in late August, except for lupine seed; which were collected in mid August. Peak collection time for lupine seed was late July to early August. Agreements were not finalized until mid August and seed was collected as soon as possible. Seed maturity all over western Oregon and Washington was early in 2004. Fields on the PMC farm were consistently two weeks ahead of the average harvest date. Seed collection on Hurricane Ridge in 2005 may be later than they occurred in 2004.

Table 2. Native Seed and Plant Collection for the Hurricane Ridge Road Cooperative Agreement in 2004 for at the Corvallis Plant Materials Center.

Species	Symbol	Accession Number	Collection dates	Amount collected
Artemisia ludoviciana	ARLU	9079359	8/31- 9/3	8g
Elymus glaucus (high elevation)	ELGL	9079356	8/31- 9/3	493g
Elymus glaucus (low elevation)	ELGL	9079352	8/15- 8/17	584
Bromus sitchensis (high elevation)	BRSI	9079357	8/31- 9/3	103g
Bromus vulgaris (low elevation)	BRVU	9079353	8/15- 8/17	842g
Eriophyllum lanatum	ERLA6	9079358	8/31- 9/3	160g
Lupinus latifolius	LULA4	9079351	8/15- 8/17	495g

ARLU *Artemisia ludoviciana* 9079359
This species experienced heavy weevil predation in 2004, and a large amount of viable seed was difficult to obtain. Seedheads were clipped with hand pruners, placed in paper bags, and left in an open greenhouse to dry. An office brush machine with a sandpaper drum was used to break up seedheads and reduce fuzz. An air-screen machine was used to clean the seed.

BRSI *Brome sitchensis* 9079357
Seeds were collected as they began to shatter. Seeds and seedheads turned a light straw color when mature. Seeds were easily hand-stripped, placed in paper sacks or cloth bags, and left in an open greenhouse to dry. An office brush machine was used to break off awns, then seed was further cleaned using an air-screen machine.

BRVU *Bromus vulgaris* 9079353
The seed of this grass does not shatter as easily as many others, so it can be collected well after it has matured on the plant. Seeds were hand-stripped when they turned a reddish yellow, placed in paper sacks or cloth bags, and left in an open greenhouse to dry. A lab-sized brush machine was used to break off awns, then seed was further cleaned using an air-screen machine.

ELGL *Elymus glaucus* (High & Low) 9079356 & 9079352
Determining maturation on this species can be difficult. Seeds will easily fall from the plant when pulled, even when the florets are very green. It is best to wait until the seedheads turn a silvery yellow color to harvest blue wildrye. Entire seedheads were hand picked from stems, placed in paper sacks or cloth bags, and left in an open greenhouse to dry. A brush machine was used to break off awns, then seed was further cleaned using an air-screen machine.

ERLA6 *Eriophyllum lanatum* 9079358
Seedheads were cut off using hand pruners. Seeds do not shatter and are mature when they turn black inside the receptacle. They were placed in paper bags and left in an open greenhouse to dry. All plant material was fed through a hammermill to loosen the seeds. An air-screen machine was used to clean the seed.

LULA4 *Lupinus latifolius* 9079351
This species is very abundant in the high elevations and a large amount of seed can be collected in a small period of time. Entire stalks of pods were cut with hand pruners when pods were brown to black. They were collected in paper bags, then emptied into a large plastic swimming pool with a screen over the top, inside of an open greenhouse. Most pods shattered as they dried. All plant material was fed through a hammermill to break up pods. An air-screen machine was used to clean the seed

IV. Experimental Propagation
Initial germination test results for BRSI were very low. Seed appeared to be viable, so trials were performed. Seeds were placed in plastic germination boxes on moistened germination paper and stored in a walk-in cooler for 60 and 90 days each. One “control” box of seeds was left in a greenhouse set at fall temperatures (60 degree days, 50 degree nights). The control boxes exhibited 16% germination (after 6 weeks), while boxes that were left in the cooler for 60 and 90 days had 75% and 90% germination, respectively. These findings suggest that this high elevation (4000-5000ft) ecotype has a physiological dormancy.

Figure 1. Non carbon-banded field of ELGL at the Corvallis Plant Materials Center, November 4, 2004.

Figure 2.Carbon-banded field of ELGL at the Corvallis Plant Materials Center, November 4, 2004.

V. Field Seed Increase

All seed collected in 2004 was cleaned and informal germination tests were performed on most of the seed lots prior to planting. Grasses and ERLA were seeded into fields on September 29 and October 5, 2004 using a six-row Planet Jr. seeder. All fields, except high elevation ELGL were carbon banded using a backpack sprayer, then sprayed with Diuron. Carbon-banding clearly creates cleaner fields (Figures 1&2). Seedlings have less competition with weeds, and stands establish quicker and have higher vigor. Fall rains began the day after both seeding and spraying were completed so no fall irrigation was needed. Most seedlings emerged within 2-3 weeks after planting, and stand establishment and vigor was rated high for all species, except BRSI and ERLA (seedlings are expected to emerge throughout the winter after overcoming physiological dormancy). Diuron provided fair weed control. 2,4-D was applied in November to grass fields to control broadleaves. Glyphosate was applied over ERLA fields in November to control all weeds (seedlings will not emerge until late winter).

Table 3. Establishment information for new seed increase fields for the Hurricane Ridge Cooperative Agreement at the Corvallis PMC in 2004.

Species	Amount seeded	Germ	Approximate seeding rate	Establishment rate
ELGL (LO) 0.11 acres or 36 130' rows 12" btwn rows	548g	87%	11lbs/acre (bulk) 10lbs/acre (PLS) 28 PLS/ft-row	27 seedlings/ft
BRVU .13 acres or 43 130' rows 12" btwn rows	842g	78%	14lbs/acre (bulk) 11lbs/acre (PLS) 25 PLS/ft-row	19 seedlings/ft
BRSI 0.033 acres or 6 130' rows 12" btwn rows	88g	75%	6lbs/acre (bulk) 4.5lbs/acre (PLS) 6 PLS/ft-row	Not determined yet
ELGL (HI) 0.06 acres or 9 240' rows 12" btwn rows	479g	70%	19lbs/acre (bulk) 13lbs/acre (PLS) 33 PLS/ft-row	25 seedlings/ft
LULA 0.04 acres or 12 137' rows 24" btwn rows	439g	64%	26lbs/acre (bulk) 17lbs/acre (PLS) 11 PLS/ft-row	5 seedlings/ft
ERLA 0.05 acres or 15 133' rows 12" btwn rows	158g	N/A	7.6lbs/acre (bulk)	Not determined yet

LULA was seeded using a single-row Planet Jr walk-behind seeder. 2ft wide strips of weed fabric were tacked down in between the rows to control weeds and to act as a passive seed collector. Seeds can be swept up off the weed fabric as the pods shatter.

Figure 1. LULA4 field seeded in between strips of weed fabric, Corvallis Plant Materials Center, September 25, 2004.

VI. Container Plant Production

Seed that was leftover from mechanical seeding was sown into 6" cone-tainers and will be transplanted as plugs to fill in thin spots in the fields or to expand the fields. The ARLU collection was insufficient to be sown directly into a field using a mechanical seeder. These seeds were sown into containers filled with moistened media (Sunshine #1, a peat-based soil-less media) amended with micronutrients (MicroMax) and a balanced slow-release fertilizer and will be transplanted into a field in late spring of 2005.

Table 4. Container Plant Production in 2004 at the Corvallis PMC in 2004 for the Hurricane Ridge Cooperative Agreement.

Symbol	Accession Number	Amount seeded	Amount produced	Treatment
ARLU	9079359	5g	950 cones	14-day cold-moist stratification
BRSI	9079357	2g	100 cones	none
BRVU	9079353	9g	500 cones	none
ELGL (HI)	9079356	1g	200 cones	none
ELGL (LO)	9079352	5g	500 cones	none
LULA4	9079351	43g	900cones	scarified

VII. Delivery of Plant Materials
No deliveries were made in 2004.