

CORVALLIS PLANT MATERIALS CENTER
NATURAL RESOURCES CONSERVATION SERVICE
CORVALLIS, OREGON
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December 30, 2007

THE 2007 OLYMPIC NATIONAL PARK ANNUAL REPORT:
Elwha River Ecosystem and Fisheries Restoration

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 the ecological restoration of Lake Mills and Lake Aldwell following the removal of two high head dams on the Elwha River. It was agreed that the PMC would propagate a minimum of 4000 lbs of grass and forb seed. A more detailed production list will be determined by PMC and NPS staffs as restoration plans are finalized. Dam removal was again delayed in 2007. Plans now estimate that the dams might be removed in 2012. Most of the fields that are now in production will not survive until 2012 and the seed that is produced from the existing fields (and from previous years) will not be viable in 2012. Possible exceptions are the sedges and legumes. These plants and seeds are long-lived. Seed production on these species will continue in 2008 and future years. Production on all other species will be halted until dam removal plans have been finalized and demolition has begun.



Figure 1. Goblin's Gate, Elwha River, Olympic National Park, August 15, 2006.

Activities in 2007 included collecting seed of *Lupinus latifolius*; establishment and maintenance of seed production fields including four grasses, two forbs, three rushes, one legume, and three sedges; containerized stock production of eight species; and maintenance of cutting blocks of nine shrubs. Some species were discontinued this year due to change in restoration plans or overproduction in previous years. Details are provided below.

II. Accessions Involved

Table 1. Accessions involved and activities performed in 2007 for Elwha River Ecosystem and Fisheries Restoration Cooperative Agreement at the Corvallis Plant Materials Center.

Species	Common name	Symbol	Accession number	2007 Activity ¹
<i>Achillea millefolium</i>	common yarrow	ACMI2	9079349	sfp
<i>Agrostis exarata</i>	spiked bentgrass	AGEX	9079401	sfp
<i>Artemisia suksdorfii</i>	coastal wormwood	ARSU4	9079400	sfp
<i>Aruncus dioicus</i>	goatsbeard	ARDI8	9079370	sfp
<i>Bromus complex</i>	Brome complex	BR sp	9079332	sfp
<i>Carex deweyana</i>	Dewey sedge	CADE9	9079330	sfp, pxn
<i>Carex hendersonii</i>	Henderson's sedge	CAHE7	9079331	sfp, pxn
<i>Carex pachystachya</i>	thick-headed sedge	CAPA14	9079329	sfp, pxn
<i>Deschampsia elongata</i>	slender hairgrass	DEEL	9079335	sfp
<i>Elymus glaucus</i>	blue wildrye	ELGL	9079334	sfp
<i>Eriophyllum lanatum</i>	wooly sunflower	ERLA	9079441	sxn
<i>Juncus bolanderi</i>	Bolander's rush	JUBO	9079371	pxn, sfp
<i>Lonicera ciliosa</i>	orange honeysuckle	LOCI3	9079364	cb
<i>Lonicera involucrata</i>	honeysuckle	LOIN	9079363	cb
<i>Lupinus latifolius</i> var. <i>latifolius</i>	broadleaf lupine	LULA4	9079336	pxn, sfp, col
<i>Luzula comosa</i>	Pacific woodrush	LUCO	9079444	pxn, sfp
<i>Luzula parviflora</i>	smallflowered woodrush	LUPA4	9079337	pxn, sfp
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottowood	POBAT	9079369	cb
<i>Ribes divaricatum</i>	spreading gooseberry	RIDI	9079365	cb
<i>Ribes lacustre</i>	prickly currant	RILA	9079366	cb
<i>Rosa nutkana</i>	nutka rose	RONU	9079338	cb
<i>Rubus spectabilis</i>	salmonberry	RUSPS	9079362	cb
<i>Salix lucida</i> var. <i>lasiandra</i>	Pacific willow	SALUL	9079368	cb
<i>Salix sitchensis</i>	Sitka willow	SASI2	9079361	cb
<i>Sambucus racemosa</i>	red elderberry	SARA2	9079367	cb
<i>Symphoricarpos albus</i>	common snowberry	SYAL	9079339	cb

¹- sfp= seed increase, trl= production research trial, pxn= plant production, col= collected plant materials from park, cb= cutting block

III. Native Seed and Plant Collections

Only one trip occurred this year, due to project delays. Only *L. latifolius* seed was collected this year. It was a bad seed year for Lupines (many seed predators, not much flowering) and 15g of seed was collected.

IV. Experimental Propagation

NPS staff collected seeds of *Lathyrus polyphyllus* this year. Germination trials are being conducted and results will be included in the 2008 report.

V. Cutting Block Maintenance

The base of all willows and elderberry shrubs were wrapped with aluminum foil to prevent damage from rodents. Individuals that had died the previous fall were replaced with healthy cuttings from other plants within the cutting blocks. All cutting blocks were fertilized with a slow release fertilizer in March. Many willows were infested with stem borers this year; stems were cut very low to the ground and hopefully will survive. Cutting blocks will be maintained during project delays.

VI. Field Production Activities

Containerized plants that were produced in the fall of 2006 were transplanted into fields in January 2007. Fields of *Luzula campestris*, *L. parviflora*, and *L. latifolius*, were established or expanded using transplants. *Juncus bolanderi* plants were transplanted into artificial ponds in January 2007.

Field Production Notes for 2006:

Weed control in grass fields was primarily performed by hand (mainly to remove exotic perennial grasses) and spraying borders and spot-spraying with glyphosate. Broadleaf herbicides (Bison and Banvel) were applied to grass fields in February and May.

Artemisia suksdorfii, *Carex hendersonii*, *Carex pachystacha*, *Carex deweyana*, *L. campestris*, and *L. parviflora* fields were hand weeded monthly through May. Fields were rouged before harvest to remove any seed-bearing weeds.

Fall sown *Deschampsia elongata* and *Agrostis exarata* fields were fairly weak throughout the winter. These fields were much less vigorous than previous year's fields. They flowered and produced a poor amount of seed. These species might be best produced as spring sown fields. They would not flower on the first year, but they would be healthy established plants during their first winter and would flower the following spring. This adds a half year of maintenance onto the fields, but would probably increase yields.

Harvest Notes for 2007:

Fields were harvested by hand with rice knives, swathing and combining, seed stripper or the new “moon rover”. *D. elongata* field was seed-stripped this year. This seems to be the most effective harvest method that the PMC has tried with this species. Seeds were easily stripped from the plants and there was no shatter. Almost all the seed was recovered. Timing is critical with this species. Hot temperatures or winds can turn this species from green seed to shattering in a couple of hours. Fields need to be checked multiple times each day when they are close to being mature.

The seed stripper was also used on the *A. exerata* field. This is the most promising harvest method that the PMC has used on this species. The seed is very tiny and shatters easily. Most harvest methods, such as swathing and combining, are too rough and shatter or blow the seed out the back of the combine. The seed stripper removed all the seed off of the plants and seemed to catch it all. The brush had to be slowed down so it did not spit the seed back out onto the ground. Using a slower brush speed and a faster driving speed than usual, harvest was very efficient. Seed was also very clean. The seed stripper only removed seeds and a bit of chaff from the plant. Minimal cleaning is needed after this form of harvest.

The “moon rover” was used this year on the *C. pachystachya* field. Only the older section of the field was harvested (the younger side barely flowered and was very weedy). The moon rover was an okay harvester for this species. Some seed heads bent over and were not cut. It was possible to drive one way across the field and then turn around and drive the other way across the field to get all the seed heads, but it wasn't very efficient. This species tends not to shatter too easily. It might be possible to swath



Figure 2. *Bromus* complex seed increase field, June 10, 2007.

and combine this sedge if fields are very large. The PMC fields are still small (under 0.25 acres), but this technique should be tried as fields are expanded.

The *Bromus* complex field experienced some mortality in the older section of the field in the spring of 2007. The PMC had many weeks of severely wet and cold weather in March. There was standing water in the field for days at a time, in the same area that

experienced mortality. The newer section of the field looked undamaged.

C. deweyana plants flowered this year, but these plants are still young and have not reached full maturity. Seeds were hand harvested, which was very labor intensive. The moon rover would be a good choice for this field as the plants get larger. If the field size reaches over 0.25 acres, swathing and combining could be an efficient harvest method. This field will be retained and expanded until dam removal.

The *E. glaucus* field reached peak production this year, despite this being a bad year for the grasses. The PMC experienced rain during the flowering periods of many of the grass species in this project. Many other grass growers in the Willamette Valley had lower yields from their grass fields in 2007.

The *L. latifolius* field is growing quite well. Plants are getting larger and flowering more, and the field has been expanded too. This field is doing well considering how limited the wild collections are. It is still inefficient to keep this species as a part of this project because the increase fields are so small, and it will take many years to make them a decent size. But the seeds are very long lived and any seed produced now will be viable when it is needed for the restoration site.



Figure 3. *Lupinus latifolius* seed increase field, May 10, 2007.

The *Carex hendersonii* plants are performing well at the PMC. This plant is tolerating full sun and moderately heavy clay soils. Plants go dormant soon after flowering, but seem to be getting larger every year and producing a fair amount of seed. The primary constraint in working with

this species is the limited amount of seed in the wild.

The *L. parviflora* field flowered for the first time in 2007. Harvest was performed by hand and was very inefficient. This species seems to be really struggling in the PMC fields. The full sun and summer drought have caused a lot of mortality in the seed increase field.

Early fall rains seemed to ruin the flowering and seed maturation of the *A. suksdorfii* field. The plants are large and healthy and this year they were covered with blooms. Unfortunately, the PMC experienced three weeks of rain in September. The rain coincided with the end of the flowering period. The plants were checked multiple times, but no seed was ever found. The field was not harvested.

The *L. comosa* plants are performing well at the PMC. This plant is tolerating full sun and moderately heavy clay soils. Plants go dormant soon after flowering, but seem to be getting larger every year and producing a good amount of seed. The main limitation in working with this species is the limited amount of seed in the wild.

Juncus bolanderi plants flowered this year. Stems were cut by hand using rice knives. This plant will always have to be hand harvested due to the size and shape of the ponds. These plants are growing well in the ponds and are expanding.

Table 2. Seed harvest in 2007 for the Elwha River Ecosystem and Fisheries Restoration Cooperative Agreement at the Corvallis PMC.

Species	Field size (ac)	Date(s)	Method	Yield	Comments
<i>Bromus complex</i>	0.42	June 13/ June 20	seed stripper	70 lbs	older stand fairly spotty, high/med vigor
<i>Carex deweyana</i>	0.02	June 21	hand	1 lb	small stand, high vigor
<i>Carex pachystachya</i>	0.22	June 19	moon rover	12 lbs	good stand, medium vigor
<i>Deschampsia elongata</i>	0.35	June 27	seed stripper	16 lbs	fair stand, low vigor
<i>Elymus glaucus</i>	0.56	July 2, July 12	swath/ combine	142 lbs	Excellent stand, high vigor
<i>Lupinus latifolius</i>	0.01	May 22- June 20	hand	1 lb	good stand, high vigor
<i>Luzula comosa</i>	0.001	May 29- June 18	hand	0.7 lbs	small stand, high vigor
<i>Agrostis exerata</i>	0.3	July 6	seed stripper	18 lbs	fair stand, med vigor
<i>Carex hendersonii</i>	0.001	June 14	hand	0.1 lbs	small stand, high vigor
<i>Luzula parviflora</i>	0.01	June 14	hand	29 g	fair stand, low vigor

Following harvest, most fields were removed due to delays in the project. Legume and sedge fields were left in and seed production on these species will continue. *E. glaucus*

field was left in as a trial plot for herbicide testing. Any seed produced from the field will be used for research purposes and then destroyed.

VII. Container Plant Production

A very small amount of *L. latifolius* seed was collected in 2007 and 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. Plants will be transplanted into a field when appropriate.

VIII. Seed Test Results/Delivery of Plant Materials

No deliveries were made in 2007. All seed is being held at the PMC in cold storage until requested. Samples from lots of seed that were produced at the Corvallis PMC were sent to the Oregon State University seed lab for germination and purity tests. Tests were conducted in September of 2007. Results are listed below.

Table 3. Germination and purity test results, and quantities for seed lots produced at the Corvallis Plant Materials Center.

Species	%Purity	Germination	Bulk lbs	PLS lbs
<i>Elymus glaucus</i>	99.16	96	142	135
<i>Deschampsia elongata</i>	85.79	89	16	12
<i>Agrostis exarata</i>	99.48	95	18	17
<i>Bromus complex</i>	99.07	96	70	67
<i>Achillea millefolium</i> ¹	96.77	95	50	46

¹-seed lot produced in 2006.