

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
(formerly, USDA, Soil Conservation Service)

Big Flats Plant Materials Center
Box 360, RD #1, Rt. 352
Corning, NY 14830-0360

March 5, 1996

Wendell G. Hassell
Plant Materials Technical Advisor
National Park Service
Denver Service Center - PT
P.O. Box 25287
Denver, CO 90225

Dear Wendell,

Please find attached our 1996 report for work the Big Flats Plant Materials Center has done for the Acadia National Park. Copy of the poster session presented at the Society of American Foresters Annual Meeting on our work at Acadia is attached. I have submitted this poster session to the Society of Ecological Restoration for their annual meeting this summer. I am sending copies of the report to Acadia National Park.

If you have any questions, please give me a call.

Sincerely,



Martin van der Grinten
Manager
Big Flats Plant Materials Center

cc: John Dickerson, PMS, NRCS, Syracuse, NY
Judy Hazen Connery, Natural Resource Specialist, NPS, Acadia, Bar Harbor, ME
Linda Gregory, Botanist, NPS, Acadia, Bar Harbor, ME

BIG FLATS PLANT MATERIALS CENTER
USDA, NATURAL RESOURCES CONSERVATION SERVICE
CORNING, NY

1995 ACADIA NATIONAL PARK ANNUAL REPORT

I. INTRODUCTION

The USDA. Natural Resources Conservation Service (formerly Soil Conservation Service), Big Flats Plant Materials Center entered into an interagency agreement with the USDI, National Park Service, Acadia National Park on September 21, 1992. The Natural Resources Conservation Service agreed to:

- A. Collect seed of selected species from within Acadia National Park boundaries.
- B. Use these seeds to produce isolated increase fields of grasses and forbs and transplants of shrubs and trees. A minimum of (3) grasses, (3) forbs, (6) shrubs, and (2) tree species will be supplied.
- C. Make available seed and transplants to Acadia national Park for revegetation of the Federal Lands Highways Program road projects in the park from 1994 through 1996.

The park will use the plant materials for roadside revegetation after resurfacing the Park Loop Road and up-grading the Carriage Paths in the park. Since this agreement was approved in September, 1992, PMC activities have focused on seed collection in the Acadia National Park, seed processing and conditioning and seed/plant propagation at the Plant Materials Center.

II. ACCESSIONS INVOLVED

The following species have been collected for increase:

Common Name	Scientific Name	Symbol
<u>Grasses</u>		
poverty grass	Danthonia spicata	DASP2
common hairgrass	Deschampsia flexuosa	DEFL
red fescue	Festuca rubra	FERU2
<u>Forbs</u>		
field pussytoes	Antennaria neglecta	ANNE
large leaf aster	Aster macrophyllus	ASMA2
New York aster	Aster novi-belgii	ASNO
Canada goldenrod	Solidago canadensis	SOCA6
Downy goldenrod	Solidago puberula	SOPU
rough-stemmed goldenrod	Solidago rugosa	SOPU2
yellow rattle	Rhynanthus crista-galli	RHCR2
flat-topped aster	Aster umbellatus	ASUM
wild saraparilla	Aralia nudicaulis	ARNU2

Shrubs

bunchberry dogwood	Cornus canadensis	COCA13
bayberry	Myrica pennsylvanica	MYPE2
rhodora	Rhododendron canadense	RHCA6
lambkill/sheep laurel	Kalmia angustifolia	KAAN
lowbush blueberry	Vaccinium angustifolium	VAAN
dwarf juniper	Juniperus communis	JUCO6
black huckleberry	Gaylussachia baccata	GABA
wild raisin	Virburnum cassinoides	VICA
winterberry	Ilex verticillata	ILVE

Trees

red maple	Acer rubrum	ACRU
shadbush	Amelanchier spp.	AMELA
white birch	Betula papyrifera	BEPa
white pine	Pinus strobus	PIST
red spruce	Picea rubens	PIRU
white spruce	Picea glauca	PIGL
red oak	Quercus rubra	QURU

III/IV COLLECTION INFORMATION/SEED CONDITION INFORMATION

Collections were made throughout the park so each species was collected from numerous locations. The seed collections have been combined for each species and are considered as one population. Vegetative material were made of some shrub species.

One collection was made in 1995: October 24-27, 1995, that included seed and vegetative materials.

<u>SPECIES</u>	<u>HARVEST DATE</u>	<u>BULK HARVEST AMOUNT</u>	<u>CLEAN SEED WT</u>
<u>FORBS</u>		<u>(gm/lb)</u>	<u>(gm/lb)</u>
large leaf aster lb) Aster macrophyllus	10/25/95	(477 gm/1.05 lb)	(16.6 gm/.04 lb)
New York aster Aster novi-belgii	10/25/95	(454 gm/1.00 lb)	(9.3 gm/.02 lb)
flat-topped aster Aster umbellatus	10/25/95	(250 gm/.55 lb)	(19.0 gm/.04 lb)
Downy goldenrod Solidago puberula	10/25/95	(477 gm/1.05 lb)	(3.3 gm/.007lb)

SPECIES	HARVEST DATE	BULK HARVEST AMOUNT	CLEAN SEED WT
SHRUBS		(gm/lb)	(gm/lb)
rhodora Rhododendron canadense	10/25/95	(386 gm/.85 lb)	(30.0 gm/.07 lb)
lambkill/sheep laurel Kalmia angustifolia	10/25/95	(407 gm/.90 lb)	(0.0 gm/.00 lb)
winterberry Ilex verticillata	10/25/95	(500 gm/1.10 lb)	(37.0 gm/.08 lb)

SPECIES	DATE COLLECTED	NUMBER CUTTINGS
Vegetative Materials Collected		NO.
wild raisin Virburnum cassinoides	10/25/95	340 cuttings
winterberry Ilex verticillata	10/26/95	275 cuttings
bayberry Myrica pennsylvanica	10/27/95	180 cuttings
lambkill/sheep laurel Kalmia angustifolia	10/27/95	365 cuttings
dwarf juniper Juniper communis	10/26/95	510 cuttings
lowbush blueberry Vaccinium angustifolium	10/27/95	160 cuttings
black huckleberry Gaylussachia baccata	10/27/95	160 cuttings

The cuttings were planted in flats with a soil media of 1 part sand, 1 part peat and 1 part perlite. The cuttings were dipped in Woods rooting compound just prior to planting. The flats were placed in the greenhouse under an enclosed mist system.

Bunchberry dogwood (Cornus canadensis) plants (415) were dug up bareroot and potted in Metro Mix 250 and placed in the greenhouse. Since seed may take 2 or more years to germinate, cuttings were explored. So far, this technique has merit.

V. SEED PRODUCTION ESTABLISHMENT - FIRST YEAR

A. GREENHOUSE TRANSPLANTS TO THE FIELD

Species	Planting Date	Rate (lb/A)	Acres Planted	Stand Rating	Seed Yield
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large leaf aster	7/3/95	900 plants	.1 ac	good	0
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Plants were started in greenhouse in Rootainers on 3/9/95, totaling 1100 plants. Transplanted to field (block 4) on July 3, 1995, with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting. The plants did not form seedheads in the first year.

New York aster	7/5/95	750 plants	.1 ac	good	0
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Plants were started in greenhouse in Rootainers on 3/10/95, totaling 1100 plants. Transplanted to field (block 4) on July 5, 1995 with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting. The plants produced seed heads in the first year.

flat-topped aster	7/5/95	750 plants	.1 ac	good	0
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Plants were started in greenhouse in Rootainers on 3/9/95, totaling 1100 plants. Transplanted to field (block 4) on July 5, 1995, with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting.

Downy goldenrod	7/5/95	650 plants	.1 ac	good	0
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Plants were started in greenhouse in Rootainers on 3/9/95, totaling 1000 plants. Transplanted to field (block 4) on July 5, 1995 with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting. Some plants produced seedheads in the first year.

Canada goldenrod	7/6/95	950 plants	.1 ac	good	0
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Plants were started in greenhouse in Rootainers on 3/10/95, totaling 1100 plants. Transplanted to field (block 4) on July 5, 1995 with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting. The plants formed few seedheads.

rough-stem goldenrod	7/6/95	800 plants	.1 ac	good	0
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Plants were started in greenhouse in Rootainers on 3/10/95, totaling 1100 plants. Transplanted to field (block 4) on July 5, 1995 with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting.

red fescue	7/11/95	2,600 plants	.3 ac	good	0
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Plants were started in greenhouse in Roottrainers on 3/9/95, totaling 3000 plants. Transplanted to field (block 4) on July 11, 1995 with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting. The plants established well but produced no seed in first year.

poverty oatgrass	6/20/95	5,500 plants	.6 ac	fair	0
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Plants were started in greenhouse in Roottrainers on 3/9/95, totaling 6600 plants. Transplanted to field (block 4) on June 20, 1995 with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting. The plants were small going into winter.

hairgrass	6/22/95	2,600 plants	.4 ac	fair	0
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Plants were started in greenhouse in Roottrainers on 3/9/95, totaling 6600 plants. Transplanted to field (block 4) on June 22, 1995 with Ellis transplanter. Row spacing 42" o.c. with plant spacing at 16" in the row. Sprayed Surflan herbicide immediately after planting. The plants were small going into winter.

B. DIRECT SEEDING INTO THE FIELD

<u>Species</u>	<u>Planting Date</u>	<u>Rate (lb/A)</u>	<u>Acres Planted</u>	<u>Stand Rating</u>
red fescue	8/29/95	3 lb/A	.4 ac	very good

Direct seeded with Planet Jr. in a prepared field (21 rows, 42" o.c., 200 feet long). The field had excellent germination with a good stand going into winter.

C. DIRECT SEEDING IN WOODY BEDS

June 7, 1995	bayberry, juniper, wild raisin, huckleberry, winterberry, bunchberry, red spruce, white spruce, white pine, red maple, birch, shadbush, saraparilla
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Species were direct seeded in the PMC woody beds. The seed was hand spread, followed by a light layer of sand and hand tapped for good soil/seed contact. The bed was covered with rye straw.

VI. SEED PRODUCTION, FOLLOWING YEARS

Transplants/Direct Seeding (Summer 1993):

Species	Production Acres	Seed Harvest Wt.	Purity	Germination	Production Yield lbs/ac
red fescue (transplants)	.69	91 lb.	85.4	94	132 lb/ac
red fescue (direct seeding)	.46	54 lb.	sample at lab		117 lb/ac
hairgrass (transplants)	.17	0			0
poverty oatgrass (transplants)	.85	0			0

Forbs direct-seeded in field had poor success due to dry weather conditions.

Transplants/Direct Seeding (summer 1994):

red fescue (transplants)	.4	68 lb	sample at lab		170 lb/ac
red fescue (direct seeding)	.4	62 lb	"	"	155 lb/ac
large leaf aster (transplants)	.1	2.2 lb			22 lb/ac
New York aster (transplants)	.1	9.3 lb			.2 lb/ac (93 gm/ac)
flat-topped aster (transplants)	.1	19 gms			.4 lb/ac (190 gm/ac)
Downy goldenrod (transplants)	.1	3.3 gms			33 gm/ac
Canada goldenrod (transplants)	.1	1.0 lb	sample at lab		10 lb/ac
Rough-stem goldenrod (transplants)	.1 ac	0 lb			0

The red fescue stands had a significant increase in seed yields from the production fields. In comparing fields established by direct seeding or transplants from the greenhouse, the 1993 fields indicated 60% more seed from the transplant section while the 1994 fields indicate no significant yield differences. The advantage of the direct seeding is that less work is involved in establishing the stand, providing the seed is available. If the seed supply is limited, transplants are a viable alternative which could have the potential of higher seed yields.

The poverty oatgrass seed production stand was removed in 1995. This field was established by direct transplants from the greenhouse, but after two years, the stand was sparse plus the individual plants were small, producing very little seed. Another field using transplants was established in 1995 to see if field seed production is possible. The poverty oatgrass plant is small and trying to get a significant seed yield is difficult.

The hairgrass is also a small plant with small seed/seed heads. Another seed production block was established with transplants in 1995 to attempt to increase seed yields. Both the hairgrass and poverty oatgrass are challenges to try to obtain harvestable yields.

The forbs seed production blocks established by transplants from the greenhouse produced excellent stands. In 1995, additional seed production blocks were established of New York aster, large leaf aster, flat-topped aster, Downy goldenrod, Canada goldenrod and rough-stem goldenrod. The stands looked very good and should produce seed in the summer of 1996. Even with good stands, the yields are small once the seed cleaning process is completed. Probably that is why commercial seed companies sell forbs by the ounce.

VII. TRANSPLANT PRODUCTION

The following potted plants were delivered to the park in 1995 and were planted direct in the revegetation work or placed in the park nursery; plus number of potted plants at the PMC in December 1995.

<u>Species</u>	<u>Number of plants delivered in 1995</u>	<u>Number of potted plant in PMC lathe house 12/95</u>
white spruce	0	5
white pine	10	7
white birch	85	50
red oak	180	235
bunchberry dogwood	25	10
sheep laurel	0	58
dwarf juniper	55	49
goldenrod	24	0
red maple	111	130
wild raisin	0	15
large-leaf aster	56	0
sarsaparilla	15	0
	<u>561 plants</u>	<u>559 plants</u>

The following plugs (1" x 1" x 4.5") were provided to the park in 1995 that were planted directly in the revegetation work or placed in the park nursery. These plugs are grown in Rootainers, commonly referred to as bookplanters, due to the fact the plastic holder opens like a book, allowing direct access to the root system.

<u>Species</u>	<u>Number of plugs delivered in 1995</u>
red fescue	840
poverty oatgrass	630
hairgrass	910
New York aster	70
rough-stemmed goldenrod	70
Downy goldenrod	70
large leaf aster	70
flat-topped aster	70
	2,730 plugs

The plugs were utilized in lieu of seed that was not available, seed available in small amounts only or the planting site required direct planting.

The fall 1994 and spring 1995 woody bed production was not successful for many of the species seeded. The PMC is now seeding these species in flats in a cold frame, allowing for more controlled growing conditions than the field production system. With better control, we hope to increase the germination rate. The fall 1994 production bed produced only 2 white pine of all that was seeded.

The spring 1995 production bed produced 244 bayberry, 100 white birch, 4 red maple and 82 white pine plants. These were potted up in the fall and placed in the greenhouse over winter.

VIII. CULTURAL TRIALS: RESTORATION PLANTING OPERATIONS

The re-surfacing of seven miles of the Park Loop Road from Kebo Mountain to Otter Cliffs was completed in the spring of 1995. Upon completion of laying the blacktop, road shoulder fill was placed extending from 2 to 6 feet back, depending on site conditions. The material was placed with a mechanical shovel, disturbing as little of the area as possible. With the park staff, federal highway inspector and the contractor working together, minimal site disturbance occurred and a good job was done by all involved.

During 1994, the PMC produced 7.8 lbs. of red fescue seed which was utilized for the seeding. Since we had a limited amount, it was decided to use our seed along 2.7 miles of road in the more sensitive areas and use the commercial mix along the remainder of the area. Where the Park Loop Road skirts along private property boundaries, we selected such areas for the commercial mix.

The next problem was spreading such a small amount of seed over a large area. Hand seeding and the other option of having the contractor hydroseed our material was impractical. The Plant Materials Center delivered a Brillion seeder to the park that was utilized by the park personnel to seed the 2.7 miles of road. This is a turf grass seeder that has 2 cultipacker rollers with the seed placement located between the 2 rollers. Therefore, the first roller firms and levels, the seed is dropped from the seed box and the second roller firms the seed into the soil. Calibration of the drill was done at the PMC and at the park prior to seeding. The "legume" box was utilized to get a seeding rate of 2.8 lbs. per acre.

The red fescue seeding was done on May 17th and 19th, 1995, with light rain showers each evening. As it turned out, 5 miles of road was seeded using setting 8 on the Brillion seeder. With seed left over, the site was seeded twice. Linda Gregory did some test plot seedings by hand from the toll booth to Sand Beach on May 22, 1995, using a combination of red fescue, hairgrass and poverty oatgrass. This selection will be monitored to observe differences in the techniques.

On June 1, 1995, the contractor did the hydroseeding and mulching along the Park Loop Road. The commercial mix was seeded at 80 lbs. per acre. Included in the hydroseeding was oat at one half bushel per acre for temporary cover (they will winter-kill next winter), 10-10-10 fertilizer at 700 lbs. per acre and lime at 7,000 lb. per acre. The straw mulch was applied at two tons per acre.

The summer conditions were relatively dry. The road shoulder fill materials became extremely hard once dried. John Dickerson, NRCS Plant Materials Specialist, surveyed the seedings on September 26, 1995, and concluded the seedings looked fine, with just small problem areas. The plants were small but overall, it looked encouraging. During the summer of 1995, a field of red fescue produced 90 lbs. at the PMC. It was decided to re-seed the areas along the Park Loop Road that had received our original seed at a 15 lb. per acre rate. The seeding was done by the commercial contractor using a hydroseeder in late September. Evaluations of the sites will be concluded in 1996.

The week of June 12, 1995, we assisted the park personnel in revegetating severe areas disturbed by the construction from building a new restroom station and drainage ditch/culvert work. At the Bear Brook Rest Station, we utilized potted plants delivered from the PMC and plants from the park nursery. The plantings were done trying to blend in with the natural surroundings. This was accomplished successfully with no mortality at the September evaluation. To decrease trampling of our planting, two small trails were designed to control the flow of people traffic. The site was mulched, plus natural rock stone was used at the drip line to control soil erosion.

Another site was near Thunder Hole, where a large area was disturbed to install a road culvert. The area was planted to a variety of trees and mulched. The final step included moving a dead tree across the site to keep people out. This is a heavily used area and if you do not control where people walk, no revegetation work will survive.

Near the Hardin Farm, along the Park Loop Road, was an area disturbed for ditching work. This site was planted to trees and forbs, using plugs. The forbs included flat-topped aster, Canada goldenrod, large leaf aster and downy goldenrod. The planting of the plugs utilized a planting dibble that worked well in the stoney soil.

The ditches along the Schooner Head Road were planted to plugs of red fescue, poverty oatgrass and hairgrass. Using the planting dibble, sections were planted using a 1 1/2" spacing between plants. A fall evaluation indicated excellent survival of the plugs.

The trail crew met with us one afternoon to discuss trail erosion problems and how our PM could assist them in stabilizing the soil. We tried some plugs of grasses along the foot trail which we will monitor over time, to see how successful this technique was at stopping erosion. The sensitive environment, the shallow soil and the high people pressure makes this a challenging problem to solve.

IX. TECHNOLOGY TRANSFER

A poster session entitled, "Native Plants for National Parks" featuring our work at Acadia, was presented at the Annual Meeting of the Society of American Foresters, in Portland, Maine, October 28 through November 1, 1995. This was authored by Judy Hazen Connery and Linda Gregory, USDI, Acadia National Park and John Dickerson and Martin van der Grinten, USDA, Natural Resources Conservation Service. The poster features a general overview of the program, with specific examples of revegetation work at Acadia utilizing native plants.

ACADIA NATIONAL PARK

Summary of Plant Materials Delivered in 1995

<u>Species</u>	<u>Seed</u>	<u>Plants</u>	<u>Plugs</u>
<u>Grasses:</u>			
red fescue	97.85 lb		840
poverty oatgrass			630
hairgrass	.85 lb		910
<u>Forbs:</u>			
New York aster	.85 lb		70
large leaf aster		56	70
flat-topped aster			70
Downy goldenrod	.04 lb		70
rough-stemmed goldenrod			70
Canada goldenrod	.02 lb	24	
Sarsaparilla		15	
bunchberry		25	
<u>Shrubs:</u>			
juniper		55	
<u>Trees:</u>			
white birch		85	
red maple		111	
red oak		180	
white pine		10	
TOTALS	99.61 lbs.	561 plants	2730 plugs

PAGE

Shipped Acadia National Park
to Maine

PM-1 No

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Date

ORDER NUMBER INFORMAL

PAGE

D&D to Acadia National Park
Maine

Shipped to Acadia National Park
Maine

Order Date

Ship Date
9/19/95

Ship Via
delivered

Govt. B/L No

PH-1 No

ACCESSION NO.	LOT NUMBER/ BIN NUMBER	GLASS	GENUS/SPECIES/SUBSPECIES COMMON NAME	DATE TESTED	PURITY %	GERM %	QUANTITY SHIPPED BULK	PLS	U/H
Acadia		24-45"	white birch (3-0 stock)	1 gal. pots			30		plts.
Acadia		4-8"	red oak (4" pots)				80		plts.
Acadia		12-20"	red maple (3-0 stock)	6" pots			41		plts.
Acadia		2-6"	white pine (5" pots)				10		plts.
Acadia		4-10"	juniper (6" pots)				15		plts.
Acadia		4-8"	Sarsaparilla (5" pots)				15		plts.
Acadia		3-24"	large-leaf aster (6" pots)				26		plts.
Acadia		2-6"	goldenrod (4" pots)				24		plts.
Acadia		1-4"	bunchberry (4" pots)				15		plts.
			Total 256 plants						

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CORNING NY 14830

Storage facility from which delivered

Ordered by

Order prepared by

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Date

Approved by Martine van der Grinten

Title PLANT MATERIALS CENTER MANAGER

Date

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Date _____

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PAGE

D&D Acadia National Park
to MaineShipped Acadia National Park
to Maine

Order Date

Ship Date

Ship Via

Govt. B/L No

PM-1 No

5/14/95

delivered

ACCESSION NO.	LOT NUMBER/ BIN NUMBER	CLASS	GENUS/SPECIES/SUBSPECIES COMMON NAME	DATE TESTED	PURITY %	GERM %	QUANTITY SHIPPED BULK	PLS	U/H
Acadia			Red fescue (bl. 4 transplants)				15.60		1lbs.
Acadia			Red fescue (bl. 4 direct seeding)				2.25		1bs.
Acadia			Hairgrass (bl. 5 transplants)				.85		1bs.
Acadia			NY Aster (bl. 4 transplants)				.85		1bs.
Acadia			Downy goldenrod (bl. 4 transplants)				16.4		1grms.
Acadia			Canada goldenrod (bl. 4 transplants)				9.5		1grms.
Acadia			Plugs:						
			Red fescue -7 bookplanters X 70 plugs per planter						490 plugs
			Hairgrass -5 bookplanters X 70 plugs per planter						350 plugs
			Poverty oatgrass -5 bookplanters X 70 plugs/planter						350 plugs
			Total - 19.25 lb. seed						
			1190 plugs						

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to Maine

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ACADIA NATIONAL PARK
1995 ANNUAL REPORT

prepared by
NATURAL RESOURCES CONSERVATION SERVICE
BIG FLATS PLANT MATERIALS CENTER

I. INTRODUCTION

The USDA, Natural Resources Conservation Service, Big Flats Plant Materials Center entered into an interagency agreement with the USDA, National Park Service, Acadia National Park on September 21, 1992. The Natural Resources Conservation Service agreed to:

- A. Collect seed of selected species within Acadia National Park boundaries.
- B. Use these seeds to produce isolated increase fields of grasses and forbs and transplants of shrubs and trees. A minimum of (3) grasses, (3) forbs, (6) shrubs and (2) tree species will be applied.
- C. Make available seed and transplants to Acadia National Park for revegetation of the Federal Lands Highways Program road projects in the park from 1994 through 1996.

The park will use the plant materials for roadside revegetation after resurfacing the park loop road and up-grading the Carriage Paths in the park. Since this agreement was approved in September 1992, PMC activities have focused on seed collection in the Acadia National Park, seed processing and conditioning, seed/plant propagation at the Plant Materials Center, establishing seed increase fields on the PMC and propagating plant materials vegetatively.

Six grasses, nine forbs, nine shrubs and six tree species are involved in this project. During 1995, seed increase blocks were established of forbs and grasses utilizing transplants initially seeded in the greenhouse. Direct seeding of a grass seed increase plot was done in late summer to expand present production blocks. Red fescue was harvested off 2 year old stands in August with significant increase in yields. Vegetative cutting material was collected on Oct. 26-27 and placed in the greenhouse mist system. Seedlings from the fall '94 and spring '95 woody beds were dug up in the fall, potted and placed in the greenhouse.

II. ACCOMPLISHMENTS

Additional seed increase fields of grasses (red fescue, poverty oatgrass, hairgrass) and forbs (large leaf aster, NY aster, flat-top aster, Downy goldenrod, Canada goldenrod and rough-stemmed goldenrod) were established this summer using transplants started in the greenhouse.

The second harvest off seed increase fields established in 1993 was done late summer and fall with the following yields:

Red fescue	(1.2 acre - est. 1993)	145.00 lbs.
Red fescue	(1.5 acre - est. 1994)	130.00 lbs.
flat-top aster	300' row	.20 lbs.
New York aster	1200' row	.35 lbs.
large leaf aster	600' row	2.20 lbs.
Downy goldenrod	400' row	.50 lbs.
Canada goldenrod	600' row	1.00 lbs.

The second year harvest of red fescue had a significant increase over last years (7.85 lbs to 145 lbs). The poverty oatgrass stand established in 1994 was removed, due to a poor stand. Another stand with transplants was established in 1995.

Seedlings out of the woody beds were dug up in the fall, potted and placed in the greenhouse (bayberry, white pine, red maple, white birch). Overall success was low, so will utilize cold frame technique.

Vegetative material was collected in October, and the cuttings placed in the greenhouse mist system. Seed was collected of the forbs (asters and goldenrods) and shrubs (sheep laural, rhodora, waterberry).

III. TECHNOLOGY TRANSFER

The establishment of seed increase fields using greenhouse transplants worked well. For red fescue, direct seeding can successfully establish a seed increase field. In May, 2.7 miles of park loop road was seeded using grass and forb seed from the PMC. The Park utilized the PMCs billion seeder to obtain proper placement of seed, which worked well. In June, we assisted park personnel on re-vegetating disturbed areas, utilizing plants from PMC and the Park, with excellent survival. Plantings using grass plugs were tested in various locations (drainage ditches, along footpaths, steep banks) with good success and survival. For high use areas, controlling "people traffic" in re-vegetated areas is critical for survival and establishment success.