

2008 Progress Report

**Cooperative Project between the
Fort Custer Military Training Center
and
USDA-NRCS
Rose Lake Plant Materials Center**

Memorandum of Understanding for Ft. Custer Vegetative Restoration

Background Fort Custer Training Center (FCTC) in southwestern Michigan is 7500 acres of military tactical training area used by the Michigan National Guard and other branches of the armed forces. While FCTC is an important training facility, it is also home to a wide variety of natural resources, e.g., wildlife, forests, wetlands, surface water, and various rare plant and animal species. Moreover, historic and cultural resources are located on the property. The facility is federally-owned and operated by the Michigan Department of Military and Veterans Affairs (MDMVA).

Memorandum of Understanding A memorandum of understanding between the NRCS Rose Lake PMC and the MDMVA was developed for restoration of native vegetation and habitats at Fort Custer. PMC staff will provide consultation and on-the-ground assistance for collection, propagation, establishment, and maintenance of native vegetation. PMC assistance with research and selection of proper native vegetation that meets the needs of the firing ranges, ammo bunkers, and convoy reaction course areas will mutually benefit MDMVA, FCTC, and NRCS.

Deliverables The following are being realized from the cooperative agreement between MDMVA and NRCS Rose Lake PMC:

- Identification and selection of native plant species for collection, increase, testing, and evaluation for conservation uses at FCTC.
- Seed treatment protocols for overcoming natural dormancy and enhancing germination and emergence of native forbs, grasses, and herbs (Table 1).
- Nursery plantations for FCTC native plants. In 2008 nearly 20,000 cone-tainerized plants representing approximately 75 native species (Table 2) were grown in the PMC greenhouse and shadehouse from seed collected at FCTC and returned to FCTC where they were transplanted into restoration sites on post or convoy reaction course. Twenty-two species were planted in production beds for additional plantings (Table 3).
- Established production plots/fields of selected native plants (e.g., little bluestem, big bluestem, and indiagrass) to provide seed to commercial growers and for use at FCTC for prairie plantings on post.
- Technical expertise on plan development for establishing native prairie plants on the convoy reaction course.
- Consultation and hands-on implementation of weed control, planting, plot/field production, and management.
- Protocols for harvesting, cleaning, and handling of seed. Approximately 9 lbs PLS of big bluestem and 12 lbs PLS of indiagrass from FCTC were cleaned by the PMC in 2008 and returned to FCTC.

Table 1. Effect of Seed Treatment on Germination and Emergence of Native Prairie Plants, Ft. Custer Training Center and Rose Lake Plant Materials Center, 2008.

Species	Common Name	no trt	Scarification ^{1,2}	germination & emergence w/						comments	
				4° C 10 day ⁴	4° C 30 day ⁴	4° C 60 day ⁴	4° C 90 day ⁴	4° C 100 day ⁴	4° C 120 day ⁴		
<i>Agastache nepetoides</i>	yellow giant hyssop									good	
<i>Amorpha canescens</i>	Leadplant		hot H ₂ O	none w/ scar.							
<i>Anemone cylindrical</i>	candle anemone	better				good					
<i>Anemone virginiana</i>	tail thimbleweed	good				better					
<i>Aristida purpurascens</i>	arrowfeather threewain	poor		poor							surface sown
<i>Asclepias amplexicaulis</i>	clasping milkweed				good						
<i>Asclepias exaltata</i>	poke milkweed				poor						
<i>Asclepias tuberosa</i>	butterfly milkweed				good						poor seed quality
<i>Asclepias verticillata</i>	green comet milkweed				good						poor seed quality
<i>Aster laevis</i>	smooth aster	poor				good	better				
<i>Aster macrophyllus</i>	bigleaf aster	poor				good					
<i>Aster novae-angliae</i>	New England aster	poor				good					
<i>Aster oolentangensis</i>	skyblue aster	good				better					
<i>Aster umbellatus</i>	Flat topped aster	poor				good					
<i>Aureolaria flava</i>	smooth yellow false foxglove					none					
<i>Brachyelytrum erectum</i>	bearded shorthusk					good	better				
<i>Cacalia atriplicifolia</i>	pale Indian plantain						poor				poor seed quality
<i>Calamagrostis canadensis</i>	Canada bluejoint	poorest			poorer	poor					
<i>Campanula americana</i>	American bellflower	best			better	good					
<i>Carex bebbii</i>	Bebb's sedge					good					
<i>Carex brevior</i>	shortbeak sedge					good					
<i>Carex cephalophora</i>	oval-leaf sedge					better	good				
<i>Carex lasiocarpa v latifolia</i>	wolly fruit sedge					none	none				
<i>Carex muehlenbergii</i>	Muhlenberg's sedge					poor					
<i>Carex rosea</i>	rosy sedge					poorer	poor				
<i>Ceanothus americanus</i>	New Jersey tea		hot H ₂ O			poorer w/ scar.	poor w/ scar.				few seeds
<i>Cirsium discolor</i>	field thistle					better	good				
<i>Coreopsis lanceolata</i>	lanceleaf tickseed	poor				poorer					
<i>Coreopsis tripteris</i>	tail tickseed					poorer	poor				few seeds
<i>Cyperus filiculmis</i>	great plains fatsedge					poorer	poor				
<i>Danthonia spicata</i>	poverty oatgrass	good									
<i>Desmodium canadense</i>	showy tick trefoil	good		better							Rhizobia 'EL' culture
<i>Desmodium illinoense</i>	Illinois ticktrefoil	good		better							Rhizobia 'EL' culture
<i>Desmodium obtusum</i>	stiff ticktrefoil	good									few seeds, Rhizobia 'EL' culture
<i>Desmodium sessilifolium</i>	sessileleaf ticktrefoil	good									few seeds, Rhizobia 'EL' culture
<i>Elymus riparius</i>	riverbank wildrye	good									
<i>Elymus villosus</i>	hairy wildrye	good									
<i>Euphorbia corollata</i>	flowering spurge				good	better					
<i>Gentiana andrewsii</i>	closed bottle gentian				good	best	better				surface sown
<i>Helianthemum canadense</i>	longbranch frostweed	none									surface sown
<i>Helianthus divaricatus</i>	woodland sunflower	none			poor						
<i>Helianthus strumosus</i>	paleleaf woodland sunflower	none			poor						surface sown
<i>Hieracium gronovii</i>	Queendevil					good	better				surface sown
<i>Hieracium scabrum</i>	rough hawkweed					good					
<i>Hystrix patula</i>	bottlebrush grass	good									

Table 1. Cont'd from previous page.

Species	Common Name	no tmt	Scarification ^{1,2,3}	germination & emergence w/						comments
				4° C	4° C	4° C	4° C	4° C	4° C	
				10 day ⁴	30 day ⁴	60 day ⁴	90 day ⁴	100 day ⁴	120 day ⁴	
<i>Lathyrus ochroleucus</i>	cream pea		hot H ₂ O	none w/ scar.						/Ritrobie 'C' culture, moldy see
<i>Lechea villosa</i>	hairy pinweed	poor			good					surface sown
<i>Lespedeza capitata</i>	roughhead lespedeza		sandpaper	good w/ scar.						/Ritrobie 'EL' culture
			H ₂ SO ₄	good w/ scar.						/Ritrobie 'EL' culture
<i>Lespedeza hirta</i>	hairy lespedeza		sandpaper	good w/ scar.						/Ritrobie 'EL' culture
			H ₂ SO ₄	better w/ scar.						/Ritrobie 'EL' culture
<i>Lespedeza intermedia</i>	shrubby lespedeza		sandpaper	better w/ scar.						/Ritrobie 'EL' culture
			H ₂ SO ₄	good w/ scar.						/Ritrobie 'EL' culture
<i>Liatis aspera</i>	tail blazing star				poor					
<i>Liatis scariosa</i>	devil's bite				poor					insect damage
<i>Lobelia spicata</i>	palespike lobelia				good	better				surface sown
<i>Lupinus perennis</i>	sundial lupine		hot H ₂ O	good w/ scar.						/Ritrobie 'Y' culture
<i>Monarda fistulosa</i>	wild bergamot	good								
<i>Oenothera fruticosa</i>	narrowleaf evening primrose	good								surface sown
<i>Pedicularis canadensis</i>	Canadian lousewort				none					
<i>Penstemon digitalis</i>	talus slope penstemon				good	better				surface sown
<i>Prenanthes altissima</i>	tail rattlesnakeroot						good			
<i>Pycnanthemum virginianum</i>	Virginia mountainmint	good								
<i>Rudbeckia hirta</i>	blackeyed Susan	good				good				
<i>Sanicula canadensis</i>	Canadian blacksnakeroot					none	none			surface sown
<i>Scirpus pendulus</i>	rufous bulrush							good in H ₂ O		
<i>Solidago hispida</i>	hairy goldenrod				good					
<i>Solidago nemoralis</i>	gray goldenrod				good					
<i>Solidago rigida</i>	stiff goldenrod				poor					
<i>Solidago speciosa</i>	showy goldenrod				good					
<i>Spartina pectinata</i>	prairie cordgrass	poorer			poor	good				
<i>Symphoricarum cordifolium</i>	common blue wood aster	poor			good					
<i>Taenidia integerrima</i>	yellow pimpinella					poorer	poor			
<i>Teucrium canadense</i>	Canada germander					poorer	poor			
<i>Thalictrum dioicum</i>	early meadow-rue					good				
<i>Tradescantia ohiensis</i>	Bluejacket								good	
<i>Verbena stricta</i>	hoary verbena	none			good					
<i>Vernonia missouriica</i>	Missouri ironweed	poor				good				
<i>Veronicastrum virginicum</i>	Culver's root	good								surface sown
<i>Zizia aurea</i>	golden zizia	good								

¹ hot H₂O – boiling H₂O poured over seeds, seeds remained in H₂O for 24 h as temperature returned to ambient

² sandpaper – seeds abraded with medium grit sandpaper

³ H₂SO₄ – seeds soaked for 30 min in 1 N H₂SO₄, rinsed with cold water, air dried

⁴ 4° C – seeds placed in plastic bag with moist peat (or with unbleached muslin fabric for smallest seeds)

Table 2. Plants grown at PMC for FCTC. 2008.

<u>Species</u>	<u>Common name</u>	<u>Species</u>	<u>Common name</u>
<i>Agastache nepetoides</i>	yellow giant hyssop	<i>Lathyrus ochroleucus</i>	cream pea
<i>Amorpha canescens</i>	Leadplant	<i>Lechea villosa</i>	hairy pinweed
<i>Anemone cylindrical</i>	candle anemone	<i>Lespedeza capitata</i>	roughhead lespedeza
<i>Anemone virginiana</i>	tall thimbleweed	<i>Lespedeza hirta</i>	hairy lespedeza
<i>Aristida purpurascens</i>	arrowfeather threeawn	<i>Lespedeza intermedia</i>	shrubby lespedeza
<i>Asclepias amplexicaulis</i>	clasping milkweed	<i>Liatris aspera</i>	tall blazing star
<i>Asclepias exaltata</i>	poke milkweed	<i>Liatris scariosa</i>	devil's bite
<i>Asclepias tuberosa</i>	butterfly milkweed	<i>Lobelia spicata</i>	palespike lobelia
<i>Asclepias viridiflora</i>	green comet milkweed	<i>Lupinus perennis</i>	sundial lupine
<i>Aster laevis</i>	smooth aster	<i>Monarda fistulosa</i>	wild bergamot
<i>Aster macrophyllus</i>	bigleaf aster	<i>Oenothera fruticosa</i>	narrowleaf evening primrose
<i>Aster novae-angliae</i>	New England aster	<i>Pedicularis Canadensis</i>	Canadian lousewort
<i>Aster oolentangiensis</i>	skyblue aster	<i>Penstemon digitalis</i>	talus slope penstemon
<i>Aster umbellatus</i>	Flat topped aster	<i>Prenanthes altissima</i>	tall rattlesnakeroot
<i>Aureolaria flava</i>	smooth yellow false foxglove	<i>Pycnanthemum virginianum</i>	Virginia mountainmint
<i>Brachyelytrum erectum</i>	bearded shorthusk	<i>Rudbeckia hirta</i>	blackeyed Susan
<i>Cacalia atriplicifolia</i>	Pale indian plantain	<i>Sanicula canadensis</i>	Canadian blacksnakeroot
<i>Calamagrostis canadensis</i>	Canada bluejoint	<i>Scirpus pendulus</i>	rufous bulrush
<i>Campanula Americana</i>	American bellflower	<i>Solidago hispida</i>	hairy goldenrod
<i>Carex bebbii</i>	Bebb's sedge	<i>Solidago nemoralis</i>	gray goldenrod
<i>Carex brevior</i>	shortbeak sedge	<i>Solidago rigida</i>	stiff goldenrod
<i>Carex cephalophora</i>	Oval-leaf sedge	<i>Solidago speciosa</i>	showy goldenrod
<i>Carex lasiocarpa latifolia</i>	wolly fruit sedge	<i>Spartina pectinata</i>	prairie cordgrass
<i>Carex muehlenbergii</i>	Muhlenberg's sedge	<i>Symphotrichum cordifolium</i>	common blue wood aster
<i>Carex rosea</i>	Rosy sedge	<i>Taenidia integerrima</i>	yellow pimpernel
<i>Ceanothus americanus</i>	New Jersey tea	<i>Teucrium canadense</i>	Canada germander
<i>Cirsium discolor</i>	Field thistle	<i>Thalictrum dioicum</i>	early meadow-rue
<i>Coreopsis lanceolata</i>	lanceleaf tickseed	<i>Tradescantia ohiensis</i>	Bluejacket
<i>Coreopsis tripteris</i>	tall tickseed	<i>Verbena stricta</i>	hoary verbena
<i>Cyperus filiculmis</i>	great plains flatsedge	<i>Vernonia missurica</i>	Missouri ironweed
<i>Danthonia spicata</i>	poverty oatgrass	<i>Veronicastrum virginicum</i>	Culver's root
<i>Desmodium canadense</i>	showy tick trefoil	<i>Zizia aurea</i>	golden zizia
<i>Desmodium illinoense</i>	Illinois ticktrefoil		
<i>Desmodium obtusum</i>	stiff ticktrefoil		
<i>Desmodium sessilifolium</i>	sessileleaf ticktrefoil		
<i>Elymus riparius</i>	riverbank wildrye		
<i>Elymus villosus</i>	hairy wildrye		
<i>Euphorbia corollata</i>	flowering spurge		
<i>Gentiana andrewsii</i>	closed bottle gentian		
<i>Helianthemum canadense</i>	longbranch frostweed		
<i>Helianthus divaricatus</i>	woodland sunflower		
<i>Helianthus strumosus</i>	paleleaf woodland sunflower		
<i>Hieracium gronovii</i>	Queendevil		
<i>Hieracium scabrum</i>	rough hawkweed		
<i>Hystrix patula</i>	bottlebrush grass		

Table 3. Species Planted in Seed Production Beds at FCTC for Additional Plantings. 2008.	
<i>Anemone cylindrical</i>	candle anemone
<i>Asclepias amplexicaulis</i>	clasping milkweed
<i>Asclepias tuberosa</i>	butterfly milkweed
<i>Asclepias viridiflora</i>	green comet milkweed
<i>Aster macrophyllus</i>	bigleaf aster
<i>Brachyelytrum erectum</i>	bearded shorthusk
<i>Cacalia atriplicifolia</i>	pale Indian plantain
<i>Campanula Americana</i>	American bellflower
<i>Carex muehlenbergii</i>	Muhlenberg's sedge
<i>Ceanothus americanus</i>	New Jersey tea
<i>Elymus riparius</i>	riverbank wildrye
<i>Euphorbia corollata</i>	flowering spurge
<i>Helianthus divaricatus</i>	Woodland sunflower
<i>Hystrix patula</i>	bottlebrush grass
<i>Lespedeza hirta</i>	hairy lespedeza
<i>Liatris aspera</i>	tall blazing star
<i>Lobelia spicata</i>	palespike lobelia
<i>Lupinus perennis</i>	sundial lupine
<i>Penstemon digitalis</i>	talus slope penstemon
<i>Prenanthes altissima</i>	tall rattlesnakeroot
<i>Taenidia integerrima</i>	yellow pimpernel
<i>Thalictrum dioicum</i>	early meadow-rue
<i>Veronicastrum virginicum</i>	Culver's root

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Installation of seed production beds on weed barrier fabric



Completed seed production bed (mulch added after this photo was taken)



Jim Langerveld (Ft. Custer) tansplanting plugs into prairie restoration area



Plants in the ground in prairie restoration area