MAINE BIOLOGY TECHNICAL NOTE 1: UPLAND WILDLIFE GRASS & HERBACEOUS PLANTING RECOMMENDATIONS FOR MAINE

The following tables recommend planting mixes to benefit upland wildlife. Although introduced grass and legume mixtures are used widely in Maine for the benefit of wildlife, and are included in this technical note (Table 4), the majority of recommended planting mixtures involve species native to Maine (Tables 1-3, 5). The species and mixes herein are adapted from Technical Note NY-36 developed by NRCS' Big Flats Plant Materials Center, and are simply recommendations. Other seed mixes and planting rates may be applicable to site specific conditions and landowner objectives. Also note that the tables include species and species mixes adapted to somewhat poorly drained and poorly drained soils not typical of upland sites; however, wetland inclusions within upland habitat may be present and may need to be considered.

Native plants provide many ecological services. Most native grasses are bunch grasses that have an upright growth form, and when properly established and managed provide valuable nesting and brood rearing habitat and over-winter cover for many species of wildlife. The open structure provided at the ground level can result in germination of forbs that are an important additional source of food and cover for wildlife, and contribute biodiversity to early successional habitats. Native plants tend to be very tolerant of nutrient poor soils, soil drainage class, soil pH, and can grow on sterile, sandy sites where introduced cool season plantings may fail. Due to this adaptability, few if any soil amendments are needed or desired to establish and maintain native season grasses. Many native grasses have strong root systems to help maintain and enhance soil quality and reduce erosion.

There are limitations to the use of native grasses in Maine, especially native warm season grasses that one should be aware of. For native warm season grass plantings, available growing season degree days (length of the growing season and available heat units), together with frost heave potential (interaction of soil drainage, aspect, may cause frost heaving - especially at higher elevations) are extremely important considerations. Also important is the pre-existing presence of cool season grasses, especially introduced varieties, and/or persistent perennial weeds. Cool season grasses and weeds may out-compete native warm season grasses during critical early establishment phases, due to their adaptations to maximize annual biomass production during spring and fall. Cost is another important consideration as native plant materials are more expensive than introduced forage plants. Control of weeds and competing grasses, proper seedbed preparation, planting and post-planting management are critical to success. With native plantings most difficulties occur during the planting year and the following spring.

If planting of native grasses and forbs is the objective, we highly recommend planners seek the assistance of NRCS Plant Materials specialists, or those with local experienced in the establishment and management of native grasses and forbs.

Table 1. ***NATIVE COOL SEASON GRASS SPECIES*** (Seed Mixtures and Soil Suitability Recommendations)
- Grass seeding rates are PURE LIVE SEED (PLS, see note below). These seeding rates ASSUME No-Till Seeding. If a No-Till Drill is NOT used, increase Total grass seeding rate by ≈2 lbs. proportionally based on existing seeding ratio.

Seed Mixtures[1] (seeding rate if no-till drill is *not* used)	**Latin Names** (Varieties[2])	**Drainage Class**[3]				
		ED	**WD**	**MWD**	**SPD**	**PD**
Canada wild rye 5 (6) lbs/ac **and** Riverbank wild rye 3 (3.5) lbs/ac **and** and Bottlebrush 2 (2) lbs/ac **and** Autumn Bentgrass 3 (3.5) lbs/ac *Native Forbs[4] **optional**	*Elymus canadensis* *Elymus riparius (Common)* *Hystrix patula* *Agrostis perennans* *See Table 5*		X	X	X	
Canada wild rye 4 (4.5)lbs/ac **and** Virginia wild rye 4 (4.5) lbs/ac **and** Riverbank wild rye 4 (4.5) lbs/ac **and** Rough Bentgrass 3 (3) lbs/ac **and** Fringed brome grass 4 (4.5) lbs/ac *Native Forbs[4] **optional**	*Elymus canadensis* *Elymus virginicus* *Elymus riparius (Common)* *Agrostis scabra* *Bromus ciliatus* *See Table 5*		X	X	X	
Riverbank wild rye 4 (4.5) lbs/ac **and** Virginia wild rye 4 (4.5) lbs/ac **and** Fringed brome grass 6 (7) lbs/ac Native Forbs[4] **optional**	*Elymus riparius (Common)* *Elymus virginicus* *Bromus ciliatus* *See Table 5*				X	X

[1] These seeding recommendations are for wildlife purposes, and not for critical area and highly erodible areas.

[2.] There may be other varieties beyond those listed above that are suited to New England conditions.

[3] ED = excessively drained; WD = well-drained; MWD = moderately well-drained; SPD = somewhat poorly-drained; PD = poorly-drained

[4] Use five species from the list. Rates based on seed size and weight and cost consideration.

PLS and Bulk Seed Calculations:

% PLS = (% purity x % Germ.) ÷ 100

Bulk seed/ac. = PLS/ac ÷ %PLS

From seed label: 96% purity; 80% germination

Example to seed 2 lbs/acre PLS of Switchgrass:

%PLS = (96% Purity x 80% Germination) ÷ 100 = 76.8%

Bulk seed/ac. = 2 ÷ 76.8% = 1.3

Bulk seed = 2.6 lbs/ac

Prices may be based on bulk seed. Take this into consideration when ordering seed. Seeds per lb can vary by year and seed lot.

Table 2 Native Warm Season Grass[1] Species (Seed Mixtures and Soil Suitability Recommendations)
- Grass seeding rates are PURE LIVE SEED (PLS). These seeding rates ASSUME drilling seed and proper weed control. If a drill is NOT used, increase total grass seeding rate by 20%.

Seed Mixtures[2] (seeding rate if drill is *not* used)	**Latin Names** (Varieties[3])	**Drainage Class[4]**				
		ED	**WD**	**MWD**	**SPD**	**PD**
Switchgrass 2 (2.5) lbs/ac **and** [3] Deertongue 4 (5) lbs/ac **and** Native Forbs[5] **optional**	*Panicum virgatum (Blackwell, Shelter)* *Panicum clandestinum (Tioga)* *See Table 5*		X	X	X	X
Big bluestem 2 (2.5) lbs/ac **and** Indiangrass 3 (3.5) lbs/ac **and** Little bluestem 3 (3.5) lbs/ac **and** Deertongue 2 (2.5) lbs/ac Native Forbs[5] **optional**	*Andropogon gerardii (Niagra)* *Sorghastrum nutans (Rumsey)* *Schizachrium scoparium (Aldous, Blaze or Camper)* *Panicum clandestinum (Tioga)* *See Table 5*	X	X			
Big bluestem 4 (5) lbs/ac **and** Indiangrass 4 (5) lbs/ac **and** Switchgrass 2 (2.5) lbs/ac Native Forbs[5] **optional**	*Andropogon gerardii (Niagra)* *Sorghastrum nutans (Rumsey)* *Panicum virgatum (Blackwell, Shelter)* *See Table 5*	X	X	X	X	
Big bluestem 3 (3.5) lbs/ac **and** Indiangrass 3 (3.5) lbs/ac **and** Deertongue 3 (3.5) lbs/ac **and** Switchgrass 2 (2.5) lbs/ac Native Forbs[5] **optional**	*Andropogon gerardii (Niagra)* *Sorghastrum nutans (Rumsey)* *Panicum clandestinum (Tioga)* *Panicum virgatum (Blackwell, Shelter)* *See Table 5*		X	X	X	X

[1] Although most native warm season grasses (nwsg) are best adapted to moist, fertile soils, they may be out competed when planted on sites with established or adjacent introduced cool season grasses and persistent perennial weeds. For this reason, nwsg are often recommended for sandy, sterile, acidic sites where they have a competitive advantage. Therefore, care must be exercised during site and species selection. See Poole et al. (1997) for more information.

[2] These seeding recommendations are for wildlife purposes, and not for critical and/or highly erodible areas

[3.] There may be other varieties beyond those listed above that are suited to New England conditions.

[4] ED = excessively drained; WD = well-drained; MWD = moderately well-drained; SPD = somewhat poorly-drained; PD = poorly-drained

[5] Use five species from the list. Rates based on seed size and weight and cost consideration.

Table 3. *NATIVE WARM[1] AND COOL SEASON GRASS SPECIES* (Seed Mixtures and Soil Suitability Recommendations) *Grass seeding rates are PURE LIVE SEED (PLS). These seeding rates ASSUME No-Till Seeding. If a No-Till Drill is NOT used, increase Total grass seeding rate by ≈ 2 lbs. proportional based on existing seeding ratio.*

Seed Mixtures[2, 3] (seeding rate if no-till drill is *not* used)	**Latin Names** (Varieties[4])	**Drainage Class[5]**				
		ED	**WD**	**MWD**	**SPD**	**PD**
Indiangrass 2 (2.5) lbs/ac **and**	*Sorghastrum nutans (Rumsey)*					
Switchgrass 1 (1) lb/ac **and**	*Panicum virgatum (Blackwell, Shelter)*					
Little bluestem 3 (3.5) lbs/ac **and**	*Schizachrium scoparium (Aldous, Blaze or Camper)*	X	X			
Canada wild rye 5 (6) lbs/ac	*Elymus canadensis*					
*Native Forbs[6] **optional**	*See Table 5*					
Big bluestem 4 (4.5) lbs/ac **and**	*Andropogon gerardii (Niagra)*					
Indiangrass 2 (2.25) lbs/ac **and**	*Sorghastrum nutans (Rumsey)*					
Switchgrass 1 (1.25) lb/ac **and**	*Panicum virgatum (Blackwell, Shelter)*		X	X		
Canada wild rye 5 (5.5) lbs/ac **and**	*Elymus canadensis*					
Autumn Bentgrass 3 (3.25) lbs/ac; **or** Rough Bentgrass 3 (3.25) lbs/ac	*Agrostis perennans; Agrostis scabra*					
*Native Forbs[6] **optional**	*See Table 5*					
Big bluestem 4 (4.8) lbs/ac **and**	*Andropogon gerardii (Niagra)*					
Switchgrass 1 (1.2) lb/ac **and**	*Panicum virgatum (Blackwell, Shelter)*					
Virginia wild rye 4 (4.8) lbs/ac **and**	*Elymus virginicus*					
Deertongue 1 (1.2) lb/ac	*Panicum clandestinum (Tioga)*					
*Native Forbs[6] **optional**	*See Table 5*			X	X	
Riverbank wild rye 4 (4.5) lbs/ac **and**	*Bromus ciliatus*					
Virginia wildrye 4 (4.5) lbs/ac **and**	*Elymus riparius (Common)*					
Switchgrass 1/2 (1.5) lb/ac **and**	*Elymus virginicus*					
Fringed bromegrass 4 (4.5) lbs/ac	*Panicum virgatum (Blackwell, Shelter)*					
*Native Forbs[6] **optional**	*See Table 5*					
Canada wild rye 6 (7) bs/ac **and**	*Bromus ciliatus*					
Deertongue 2 (2.5) lbs/ac **and**	*Elymus canadensis*					
Switchgrass 1 (1.3) lbs/ac **and**	*Panicum virgatum (Blackwell, Shelter)*		X	X	X	
Fringed bromegrass 4 (4.5) lbs/ac	*Panicum clandestinum (Tioga)*					
*Native Forbs[6] **optional**	*See Table 5*					

[1] Although most native warm season grasses (nwsg) are best adapted to moist, fertile soils, they may be out competed when planted on sites with established or adjacent introduced cool season grasses and persistent perennial weeds. For this reason, nwsg are often recommended for sandy, sterile, acidic sites where they have a competitive advantage. Therefore, care must be exercised during site and species selection. See Poole et al. (1997) for more information.

[2], These seeding recommendations are for wildlife purposes and not for critical and/or highly erodible areas.

[3] Low rates of switchgrass and deertongue will require monitoring of seedbox to maintain seed over seed drop opening.

[4.] There may be other varieties beyond those listed above that are suited to New England conditions.

[5] ED = excessively drained; WD = well-drained; MWD = moderately well-drained; SPD = somewhat poorly-drained; PD = poorly-drained

[6] Utilize five species from the list. Rates based on seed size and weight and cost consideration.

Table 4. Introduced Species (Seed Mixtures and Soil Suitability Recommendations)
*- seeding rates are based on bulk seed and **NOT** Pure Live Seed (PLS); therefore, when ordering seed obtain seed lots with the highest amount of quick or initial germination rates.*

Seed Mixtures[1]	**Latin Names** (Varieties[2])	**Drainage Class**[3]				
		ED	**WD**	**MWD**	**SPD**	**PD**
Orchardgrass 5 lbs/ac **and** Hard Fescue 6 lbs/ac **plus** Ladino Clover (upright improved varieties) 2 lbs/ac **and** Red Clover 2 lbs/ac **or** 3 lbs/ac (Birdsfoot trefoil Pardee, Norcen or Viking)	*Dactylis glomerata* *(Biljart or Serra)* *Trifolium repens* *Trifolium pratense (Common)* *Birdsfoot Trefoil (Empire)*		X	X		
Timothy 3 lbs/ac **and** Orchardgrass 4 lbs/ac **and** Bromegrass 3 lbs/ac **plus** Ladino Clover (upright improved varieties) 2 lbs/ac **and** Red Clover 2 lbs/ac **or** 3 lbs/ac Birdsfoot trefoil (Pardee, Norcen or Viking)	*Phleum pretense (Common)* *Dactylis glomerata* *Bromus ciliatus* *Trifolium repens* *Trifolium pratense (Common)* *Birdsfoot Trefoil (Empire)*		X	X	X	
Timothy 3 lbs/ac **and** Orchardgrass 4 lbs/ac **and** Red top .5 lb/ac **plus** Ladino Clover (upright improved varieties) 2 lbs/ac **and** Red Clover 2 lbs/ac **or** 3 lbs/ac Birdsfoot trefoil (Pardee, Norcen or Viking)	*Phleum pretense (Common)* *Dactylis glomerata* *Agrostis alba (Streaker or Barracuda)* *Trifolium repens* *Trifolium pratense (Common)* *Birdsfoot Trefoil (Empire)*		X	X	X	X
Timothy 5 lbs/ac **and** Orchardgrass 5 lbs/ac **plus** Ladino Clover (upright improved varieties) 2 lbs/ac **and** Red Clover 2 lbs/ac **or** 3 lbs/ac Birdsfoot trefoil (Pardee, Norcen or Viking)	*Phleum pretense (Common)* *Dactylis glomerata* *Trifolium repens* *Trifolium pratense (Common)* *Birdsfoot Trefoil (Empire)*		X	X	X	

[1] Use early varieties of the grasses when available to facilitate earlier stem elongation providing earlier cover. These seeding recommendations are for wildlife purposes and not for critical area and highly erodible areas.

[4.] There may be other varieties beyond those listed above that are suited to New England conditions.

[3] ED = excessively drained; WD = well-drained; MWD = moderately well-drained; SPD = somewhat poorly-drained; PD = poorly-drained

Table 5. *NATIVE FORBS* (Seeding and Soil Suitability Recommendations)
- seeding rates are based on bulk seed and not PLS; therefore, when ordering seed obtain seed lots with the highest amount of quick or initial germination rates.

Common Name	Latin Name (Variety)	Wetland Indicator	note: .0625 lb = 1 oz		Bulk seeds/ft^2	Soil Adaptation[3]
			Bulk Seed lb/ac[1]	Seeds/lb		
Butterfly Milkweed	*Asclepias tuberosa*	upland	0.0625	70,000	0.10	MWD
Common Milkweed	*Asclepias syriaca*	upland	0.0625	70,000	0.10	WD-MWD
New England Aster	*Aster novae-angliae*	facw	0.0625	1,216,000	1.74	PD-WD
Long-leaved Aster	*Aster umbellatus*	facw	0.0313	1,072,000	0.77	PD-WD
White Heath Aster	*Aster ericoides*	facu	0.0156	3,200,000	1.15	MWD-ED
Sunflower Heliopsis, (Ox-Eye Sunflower)	*Heliopsis helianthoides*	upland	0.5000	126,000	1.45	MWD-ED
Joe Pyeweed[2]	*Eupatorium maculatum*	facw	0.0313	2,000,000	1.43	PD-MWD
Roundhead Lespedeza	*Lespedeza capitata*	facu-	0.0625	275,000	0.39	MWD-ED
Wild Bergamot[2]	*Monarda fistulosa*	upland	0.0313	1,418,000	1.02	SPD-MWD
Grey-headed Coneflower[3]	*Ratibida pinnata*	upland	0.1250	410,000	1.18	MWD-ED
Blackeyed Susan	*Rudbeckia hirta* (Golden Jubilee)	facu-	0.0625	1,750,000	2.51	SPD-WD
Canada Goldenrod	*Solidago canadensis/altissima*	facu	0.0156	4,600,000	1.65	SPD-ED
Grass-leaved Goldenrod	*Euthamia graminifolia*	fac	0.0313	5,600,000	4.02	SPD-MWD
Boneset	*Eupatorium perfoliatum*	facw+	0.0313	2,880,000	2.07	PD-MWD
Blue Vervain[2]	*Verbena hastata*	facw+	0.0625	1,544,000	2.22	PD-MWD
White Vervain	*Verbena urticifolia*	facu	0.0625	1,000,000	1.43	SPD-WD
Showy Tick Trefoil	*Desmodium canadense*	fac	0.2500	72,000	0.41	SPD-WD
Golden Alexanders	*Zizia aurea*	fac	0.2500	184,000	1.06	SPD-WD
Giant Sunflower	*Helianthus giganteus*	facw	0.0313	160,000	0.11	PD-MWD

[1] Due to the ability of some of these and other plants to colonize the plantings and the cost of the seed, the amount of seed planted is light. If some of these species are in adjacent areas, it would be beneficial to select other species to increase species diversity. Any species could be increased to 1 seed/ft^2, taking cost into consideration, which changes yearly.

[2] These species will benefit from stratification, or may need to go through a winter to obtain full germination.

[3] ED = excessively drained; WD = well-drained; MWD = moderately well-drained; SPD = somewhat poorly-drained; PD = poorly-drained

Reference Literature

Poole, B. et al. 1997. Vegetating with native grasses in northeastern North America. USDA-NRCS Plant Materials Program and Ducks Unlimited Canada. 126pp.

USDA-NRCS. 2006. Wildlife Seed Mixtures and Soil Suitability Recommendations for Conservation Cover. NY Plant Technical Note No. 36. Big Flats Plant Material Center, Corning, NY. 5pp.