Practice Specification
Critical Area Planting (Code 342)

SCOPE:

This work will consist of establishing permanent vegetation on sites that have or are expected to have high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices. These sites may include construction sites with seeding areas specified on construction drawings.

SITE PREPARATION:

For more extensive guidance on critical area plantings, see A Guide To Conservation Plantings on Critical Areas for the Northeast.

When conventional planting is proposed (normally on slopes with a 3:1 ratio or flatter), the area should be graded or shaped to permit the safe use of equipment associated with the establishment of vegetation and maintenance.

Slopes must be stable to achieve successful establishment. Slopes shall not exceed 1.5:1 (1.5 horizontal feet for 1 vertical foot) to achieve stability. A final slope of 3:1 or flatter is preferred to facilitate equipment use.

The soil surface should be roughened lightly to a depth of 3 inches by heavy equipment or suitable farm tillage implements just prior to seedbed preparation.

If feasible, no-till seeding may also be used.

Slopes steeper than 3:1 will normally need to be planted by hand, or with a hydroseeder. The slope surface should be left in a loose, friable, and slightly roughened condition. If additional roughness is desired, stair-step grading, grooving, furrowing, or tracking may be required by heavy equipment. Grooves or furrows should be at least two inches deep and on contour. However, tracking may cause severe surface compaction, and may not be as effective as other forms of roughening. On clayed soils, use this method only if there is no other alternative.

Grading of slopes should be performed only to the extent necessary to ensure stability.

Any surface debris that may interfere with conventional cover establishment or maintenance operations should be removed.

Install water control practices such as diversions and waterways as needed. Perform cultural practices as near to contour as practicable

TOPSOIL:

Wherever feasible, topsoil should be salvaged, stockpiled and utilized. Topsoil should not be added to slopes steeper than a 2:1 unless good bonding can be achieved.

It should be added to sites where adverse soil properties or conditions exist which will prevent the successful establishment and where it can be applied properly and safely. It should be free of trash, stumps, roots, large rocks, noxious weeds, toxic substances, etc.

The sub-layer below the topsoil should be scarified to a depth of about 3 inches and the stockpiled topsoil spread evenly over the area.

SEEDBED PREPARATION:

All required seedbed preparation should be performed just prior to, and in conjunction with planting. If rainfall occurs between the initial seedbed preparation and the planting, the site may need to be reworked.

Seedbed preparation may not be required on newly disturbed areas. If needed, firm the seedbed with a cultipacker or other suitable implement following broadcasting seed and/or plants to insure good seed to soil contact and to prevent seeds or plants from being deeply buried.

Where site conditions will not permit normal seedbed preparation, loosen the soil surface by tracking and/or back-blading with a bulldozer or other suitable earthmoving equipment.

Sites which prohibit the use of conventional equipment should be prepared in such a manner that the soil surface remains in a loose and friable condition. This may be accomplished with heavy equipment during, and as a part of site preparation.

Soil disturbance can also be accomplished with the use of a chain harrow, hand tools, or similar equipment. When hydro-seeding, seedbed preparation may not be necessary if adequate site preparation was performed.

On sites where the use of conventional equipment is proposed, prepare a proper seedbed by disking, harrowing, or using other suitable tillage implements.

Incorporate lime and/or fertilizer into the top 3 to 6 inches of the soil as a part of the seedbed preparation. If hydro-seeding, incorporate the appropriate amount of lime and/or fertilizer in the slurry mix.

SOIL AMENDMENTS:

Soil fertility and pH level should be amended to the needs of the plant species planned.

Application of all soil amendments should be based on recommendations from a qualified soil testing laboratory, such as the University of Vermont Soils Testing Laboratory. Soil samples should be collected from the area to be seeded. If a sample is not feasible or practical, the following fertilizer recommendations may be used:

- Cool Season Seed Mix: Apply 400 lb/acre of 10-10-20 analysis fertilizer or equivalent. Incorporate into the top 2-3 inches of soil. If legumes are more than 20% of the mix, reduce the nitrogen to 30 lb/acre.
- Temporary Cover: Apply 300 lb/acre of 10-1010 analysis fertilizer. Incorporate into the top 23 inches of soil. If legumes are more than 20% of the mix, reduce the nitrogen to 20 lb/acre.

On sites within 50 feet of a water source, use half this rate or none at all if there is potential for runoff to enter the water.

Site specific conditions shall determine if manure or other bio-solids may be used as an alternative source of nutrients.

Apply lime to attain a pH of 6.0, if legumes are included in the seeding mixture. If only grasses are to be seeded, a pH of 5.5 is acceptable. Unless otherwise specified by the soil test, the rate of application shall be two tons of lime per acre.

SEEDING:

All purchased seed shall conform to the current rules and regulations of Vermont Agency of Agriculture, Food & Markets and shall meet or exceed the standards for purity and germination of pure live seed (80% germination). All purchased seed shall be fully tagged or certified by a commercial supplier. Seed that has become wet, moldy or otherwise damaged in transit or storage shall not be used. Farm produced seed shall be germination tested (also to meet 80% germination), as to ensure accurate pure live seeding rates to meet the criteria in this document. Legume seeds shall be inoculated with the proper, viable Rhizobium bacteria before planting. Inoculant shall be kept as cool as possible until used and shall not be used later than the date indicated on the package. When hydroseeding, use two times the recommended inoculant rate.

Seeding Methods

Apply seed uniformly by hand, cyclone seeder, drill, cultipacker-seeder, or hydroseeder. The preferred method of seeding is by drilling or cultipackerseeder method, because these methods optimize seed to soil contact. Seeding operations shall be done on the contour, to the extent feasible.

Drill

A grass drill (not a grain drill) or cultipacker-type seeder shall be used to plant grass seed. Grasses shall not be planted more than 1/4 to 1/2 inch deep. If the drill does not have a packer attachment, a packer/roller shall be trailed behind the drill. Where practical, seed shall be applied in two directions perpendicular to each other. Apply one-half the seeding rate in each direction.

Broadcast

Seed may be broadcast by using a cyclone or whirlwind seeder, or by hand. If spread by hand, small or light-seeded species such as redtop or bluestem may be mixed with filler (e.g., sawdust, rice) to achieve an even distribution. Seed shall be applied in two directions, each perpendicular to one another. One-half the seeding rate shall be applied in each direction. Seed shall be incorporated 1/8 to 1/4 inch deep by raking or dragging, cultipacking, or tracking with heavy machinery. Raked areas shall be rolled with a weighted roller to provide good seed to soil contact.

Hydroseeding

This method is best suited for steep, inaccessible areas where use of a drill or other mechanized equipment is not feasible. Hydroseeding shall be done in two separate operations with seed and fertilizer applied in the first pass, and mulch applied in the second pass. Do not use burnt or hydrated lime when hydroseeding. If legume inoculant is used, seeding shall be accomplished within 3 to 4 hours after slurry is mixed, or a fresh supply of inoculant shall be added. If possible after seeding, the area shall be tracked with heavy machinery such as a bulldozer to improve seed to soil contact.

Temporary Seeding

When the period of soil exposure is more than two months but less than twelve months, a temporary seeding (usually an annual grass) shall be used to provide short-term cover on disturbed areas. Temporary seeding may also aid in establishment of native vegetation over time while also limiting erosion. See Table 1 for recommended plant species and planting rates.

Temporary seedings shall be planted as a nurse crop with a permanent seeding mixture when rapidly growing cover is needed. When seeding toward the end of the listed planting dates for permanent seedings, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and plant with the permanent seeding mix. Companion seedings of small-seeded grasses shall not exceed 5% (by weight) of the overall permanent seeding mixture. Companion seedings of small grains such as barley, wheat, oats, or cereal rye shall be sown at one-third rates listed in Table 1.

Oats are the recommended nurse crop for warmseason grasses. Do not use cereal rye as a nurse crop for warm-season grasses because it will inhibit their germination and growth.

When a temporary or permanent seeding cannot be completed because of weather conditions or time of year, mulch only (no seeding) shall be applied as a temporary cover when soil stabilization is needed. Refer to the Mulching section of this standard for application rates and methods.

Permanent Seeding

Permanent herbaceous vegetation shall be designed to achieve a minimum stand density of 85 percent ground cover within one year.

Grasses and Legumes

Grasses and legumes suitable for critical area planting in Vermont are described in Tables 1, 2 and 3.

Seed Mixes

To establish permanent cover, select grass and legume mixes according to the guidelines listed in Table 2.

Planting Dates

Use Figure 1 and Table 2 to determine the recommended planting dates for selected mixes.

Supplemental Watering

If soil moisture is deficient, supply new seedings with adequate water (a minimum of 1/4 inch twice a day) until vegetation is well established. This is especially necessary when seedings are made in abnormally dry or hot weather or on droughty soils.

SOIL BIOENGINEERING – WOODY PLANT MATERIALS:

Soil bioengineering uses woody plant materials, typically easy-to-root shrub species, cut when dormant and placed prior to rooting into configurations which provide some immediate stability. A combination of live stakes and fascines are typically used.

For some critical erosion sites, with sufficient soil moisture, soil bioengineering can be successful with the proper shrub/tree species, good care and handling and proper planting design and installation.

For planting instructions, refer to VT NRCS Conservation Practice Standard and Specification for 612 Tree/Shrub Establishment. For additional planting instructions and for proper spacing and design information refer to A Guide To Conservation Plantings on Critical Areas for the Northeast and the NRCS Engineering Field Handbook Chapter 16 – Streambank and Shoreline Protection. For a list of species suitable for bioengineering see the VT NRCS Forestry Technical Note #2 - Vermont Trees and Shrubs for Conservation. Native species should be prioritized.

MULCHING:

Mulch shall consist of natural and/or artificial nontoxic materials, such as coconut fibers, wood shavings, straw, hay, bark chips, plastic, or fabric of sufficient thickness and durability to achieve the intended effect for the required time period. Tackifiers, emulsions, netting, pinning, or other methods of anchoring mulch shall be sufficiently durable to maintain mulch in place until it is no longer needed.

The use of mulch that contains noxious weeds is not permitted.

All newly planted areas that are subject to erosion shall be mulched. If dense ground cover is already present after planting (e.g., there is a previously seeded nurse crop sufficient to control soil erosion), then this mulching requirement shall be considered met.

Soil Stabilization Matting

Only temporary erosion matting will be used where matting is necessary. Soil stabilization matting shall have a uniform thickness and distribution of natural fibers or cords that freely allow penetration by water and plant seedlings. Two common types of temporary matting include:

- Mulch Control Netting – a temporary biodegradable rolled erosion control product (RECP) composed of planar woven natural fiber
- Erosion Control Blanket – a temporary all natural biodegradable rolled erosion control product composed of processed fibers mechanically bound together to form a continuous matrix.

Matting shall resist decay for a minimum of 3 months and a maximum of 12 months. Matting shall not contain any harmful chemicals or other materials that may leach into the soil, or reduce the germination and establishment of seedlings.

Matting products shall be applied on seeded areas and shall be secured to the soil surface according to the manufacturer's instructions. Soil stabilization matting is especially applicable where high water velocities are expected.

Straw or Hay Mulch

Straw or hay shall be applied at the rate of 2 tons per acre (90 pounds per 1,000 square feet) immediately following seeding. Straw and hay shall be unweathered and free of any known viable seeds of objectionable weeds such as Johnsongrass, shattercane, thistle, or others as specified.

Spread mulch uniformly by hand or by mechanical methods so that approximately 85% of the soil surface is covered. This will provide erosion protection and allow adequate light penetration for seedling germination.

On sites where mulch is exposed to displacement by wind and water, it shall be anchored immediately after placement. One of the following methods shall be used, depending on the size of the area, steepness of slope, and costs.

Mulch Netting

Cover mulch with jute, or other natural fiber netting. Staple the netting in place using wire staples;

Crimper

Use a tractor-drawn mulch anchoring coulter (crimper) to cut mulch into the soil surface, so as to anchor part of the mulch and leave part standing upright. Follow the general contours of the site when crimping mulch. Crimping operations are limited to areas accessible by tractor;

Liquid Mulch-Binders

Use one of following:

Organic and Vegetable-Based Binders

Mix with water and apply to mulch to form an insoluble polymer gel binder. Use at rates and under weather conditions as recommended by the manufacturer. These mulch binders shall be physiologically harmless and not impede the germination and growth of desired vegetation;

Synthetic Binders

Mix with water and apply to mulch to form an insoluble high polymer synthetic binder. Use at rates and under weather conditions as recommended by the manufacturer.

Wood Fiber or Paper Fiber Mulch

Mulch made from wood, paper, or plant fibers shall be applied at the rate of 2,000 pounds per acre, or as recommended by the product manufacturer. Mulch shall not contain any germination or growth inhibiting materials. It may be applied by hydroseeder, but shall not be mixed in the tank with the seed. Use shall be limited to flatter slopes and during optimum seeding periods in the spring and fall. Do not use on steep slopes or in concentrated flow areas.

Pelletized Mulch

Dry pellets of compressed and extruded paper and/or wood fiber products shall be applied by hand or mechanical spreader at the rate of 60 to 75 pounds per 1,000 square feet, in accordance with the manufacturer's recommendations. Pelletized mulch may contain co-polymers, tackifiers, fertilizers, and coloring agents. Apply 1/4 to 1/2 inch of water after spreading pelletized mulch to activate and expand the mulch and to provide

sufficient soil coverage. This mulch material is especially applicable for small lawns or renovation areas where weed-free mulch is desirable or straw mulch and tackifiers are not practical.

OPERATION AND MAINTENANCE:

Check new seedings and plantings every few days during the first month to assess progress and apply the needed care (irrigation, reseeding, remulching, etc.). Water sod establishments as needed for the first 30 days after placement.

After the first month, the planting should be inspected at least twice in the establishment year and then at least annually. Evaluate the site within several months of seeding. If the stand is uniform but too thin (50 to 80% ground cover), apply additional seed during the next optimum seeding period with a no-till drill, grain drill, or hydroseeder as site conditions dictate. Sites with an establishment rate of less than fifty percent (50%) should be reseeded in accordance with the original planting plan. Determine the reasons for planting failure and corrective measures should be incorporated into the remedial planting.

The planting must be restored and protected from adverse impacts such as vehicular and pedestrian traffic, pest infestations, pesticide use on adjacent lands, livestock damage and fire.

Vegetation damaged by machinery, herbicides, or erosion should be repaired promptly.

The area must be protected from livestock grazing until the vegetation is well established and the site is stabilized.

If soil moisture becomes critically deficient, irrigate the site if practical and feasible.

Weed competition must be controlled by mowing or with herbicides. Use caution when spraying chemicals on lands that are adjacent to the site.

Replacement of failed vegetation should be continued until the area progresses to a fully functional condition.

Soil amendments should be applied as required to maintain ground cover density at the desired level (usually 90% or greater). Application of soil amendments will be based upon soil testing laboratory recommendations. At a minimum, test the soil at least once every five years or more often if indicated by periodic inspections of the practice.

Maintenance practices and activities should not disturb cover during the primary nesting period from May 1 to July 15 for grassland species. Activities may occur during this period only in the establishment year.

If warm season grasses are to be mowed, they should be mowed prior to August 15 and not closer than eight inches to the ground surface.

To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds should be done on a “spot” basis to protect forbs and legumes that benefit native pollinators and other wildlife.

Remove temporary diversions, silt fences, etc. after the area is stabilized.

Additional operation and maintenance requirements may be required to be developed on a site-specific basis to assure performance of the practice as intended.

REFERENCES:

2012 A guide to Conservation Plantings on Critical Areas for the Northeast, USDA-NRCS, http://www.nrcs.usda.gov/wps/portal/nrcs/publicatio ns/plantmaterials/pmc/northeast/nypmc/pub/

Vermont NRCS and National NRCS Critical Area Planting, Code 342, Conservation Practice Standard. http://efotg.sc.egov.usda.gov/references/public/VT/ VT342.pdf

USDA-NRCS PLANTS Database Website: http://plants.usda.gov/java/

NRCS Engineering Field Handbook Chapter 16 – Streambank and Shoreline Protection. http://www.nrcs.usda.gov/Internet/FSE_DOCUMEN TS/nrcs142p2_024948.pdf

TABLE 1: Temporary Seeding for Site Stabilization

Plant Species	Seeding Rate *		Seeding Depth (inches)**	Soil Drainage Class	Recommended Seeding Dates By Plant Hardiness Zone***	
	lb/ac	lb/1,000 sf			3 & 4	5
Cool-Season Grasses						
Annual Ryegrass	40	1.0	1/8-1/2	Well-Poor	April 1-May 31 Aug 1-Sept 1	March 15-May31 Aug 1-Sept 15
Oats	96	2.2	3/4-1	Well-Poor	April 1-July 1 Aug 1-Sept 1	March 15-June 15 Aug 1-Sept 15
Cereal Rye	112	2.6	3/4-1	Well-Poor	-- Aug 1-Sept 25	-- Aug 1-Oct 5
Warm-Season Grass						
Japanese Millet	30	0.7	1/8-1/2	Well Drained	June 1-July 15 --	May 15-July 15 --
Sorghum-sudangrass	40	1.0	1/4-3/4	Well-Somewhat Poorly	June 1-July 15 --	May 15-July 15 --
Seeding Mix						
Annual Ryegrass & Oats (seeded at right angles)	10 64	0.25 1.5	1/8-1/2 3/4-1	Well-Poor	April 1-May 31 Aug 1-Sept. 1	March 15-May31 Aug 1-Sept 15

*Seeding rates for the warm-season grass are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. No adjustments are necessary for the cool-season grasses.

Seeding rates listed above are for temporary seedings, when planted alone. When planted as a nurse crop with permanent seed mixes, use 1/3 the seeding rate listed above for oats and cereal rye. For smaller-seeded grasses (annual ryegrass and foxtail millet), do not exceed more than 5% (by weight) of the overall permanent seeding mix.

Oats are the recommended nurse crop for warm-season grasses. Do not use cereal rye with warm-season grasses; it has been shown to have allelopathic properties that inhibit the germination and growth of warm-season grasses.

**For sandy soils, plant seeds at twice the depth listed above.

***Seeding dates are based on PHZ averages, timing will vary based on location within zones, elevation, aspect and slope position. Mid-summer dates subject to drought conditions.

TABLE 2: Permanent Seeding Mixtures by Purpose

Plant Species	Seeding Rate *		Soil Drainage Class of Mix	Shade Tolerance of Mix	Comments
	lb/ac	lb/1,000 sf			
Embankments, Steep Slopes, Roadsides					
1. Creeping Red fescue	20	0.5	Well-Moderately Well	Good-Fair	
Perennial Ryegrass	5	0.1			
Redtop	2	0.05			
White Clover (optional)	4	0.1			
2. Creeping Red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
	5	0.1			
	5	0.1			
	1	0.02			
	1	0.02			
Grassed Waterways, Diversions, Spillways, Streambanks					
1. Creeping Red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
2. KY bluegrass	15	0.3	Well-Moderately Well	Fair	Use this mixture in areas which are mowed frequently.
Creeping red fescue	15	0.3			
Redtop	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil or	8	0.2			
White clover	4	0.1			

Plant Species	Seeding Rate *		Soil Drainage Class of Mix	Shade Tolerance of Mix	Comments
	lb/ac	lb/1,000 sf			
Riparian Areas					
1. Creeping Red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
2. Virginia wildrye	15	0.3	Somewhat poor-Poorly		In areas where erosion is a concern, increase fowl bluegrass and autumn bentgrass by an additional 2 lb each. This may outcompete other species in the mix.
Riparian wildrye	15	0.3			
Fringed brome	5	0.1			
Fox sedge	2	0.05			
Fowl bluegrass	2	0.05			
Autumn bentgrass	1	0.02			
Carex scoparia (opt.)	0.5	0.01			
3. Deertongue	3	0.1	Well-Poorly	Fair-Poor	Use 'Hightide' switchgrass. If erosion is concern, add fowl bluegrass, not for waterways or drainage ditches.
Switchgrass	3	0.1			
Riparian wildrye	5	0.1			
Prairie cordgrass	1	0.02			
Fowl bluegrass (opt.)	1	0.02			
4. Virginia wildrye	5	0.1	Well-Somewhat Poorly	Good	For erosion control increase autumn bentgrass and fowl bluegrass to 2 lb/ac, and increase wildryes to 10 lb/ac. For somewhat poorly drained sites, substitute riparian wildrye for Canada wildrye.
Canada wildrye	5	0.1			
Fringed brome	5	0.1			
Autumn bentgrass	1	0.02			
Fowl bluegrass	1	0.02			
Logging and Haul Roads					
1. Creeping Red fescue	20	0.5	Well-Moderately Well	Good-Fair	
Perennial Ryegrass	5	0.1			
Redtop	2	0.05			
White Clover (optional)	4	0.1			

Plant Species	Seeding Rate *		Soil Drainage Class of Mix	Shade Tolerance of Mix	Comments
	lb/ac	lb/1,000 sf			
2. Creeping Red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
3. Virginia wildrye	5	0.1	Well-Somewhat Poorly	Good	For erosion control increase autumn bentgrass and fowl bluegrass to 2 lb/ac, and increase wildryes to 10 lb/ac. For somewhat poorly drained sites, substitute riparian wildrye for Canada wildrye.
Canada wildrye	5	0.1			
Fringed brome	5	0.1			
Autumn bentgrass	1	0.02			
Fowl bluegrass	1	0.02			
4. Orchardgrass	5	0.1	Well-Somewhat Poorly	Good	Temporary cover allows for natural succession.
Timothy	6	0.1			
Creeping Red fescue	3	0.1			
Redtop	1	0.02			
Ladino clover	1	0.02			
Red clover	2	0.05			
Alsike clover	2	0.05			
Bottom of Drainage Ditches, Swales, Detention Basins					
1. Creeping Red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
	15	0.3			
	5	0.1			
	2	0.05			
	2	0.05			
	1	0.02			

Plant Species	Seeding Rate *		Soil Drainage Class of Mix	Shade Tolerance of Mix	Comments
	lb/ac	lb/1,000 sf			
2. Creeping Red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
Sand and Gravel Pits, Sanitary Landfills (droughty soils)					
1. Hard fescue	15	0.3	Well-Moderately Well	Good	Low growing mix, use at 1/3 rate or lower with wildflowers, add 10 lb/ac of sheep fescue on gravel areas.
Chewings fescue	15	0.3			
Creeping red fescue	15	0.3			
Perennial ryegrass (turf type)	5	0.1			
2. Creeping Red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial Ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
3. Switchgrass	2	0.05	Excessive	Poor	Increase each of the other warm season grass by 1 lb/ac if dropping optional species.
Coastal panicgrass	2	0.05			
Big bluestem	2	0.05			
Little bluestem	1	0.02			
Canada wildrye	5	0.1			
Sand lovegrass (opt.)	2	0.05			
Sand bluestem (opt.)	2	0.05			
4. Little bluestem	4	0.1	Excessive-Moderately Well	Poor	Short native mix, for wildflowers reduce deertongue by 1/2.
Canada wildrye	5	0.1			
Deertongue	2	0.05			
Sideoats grama (opt.)	3	0.1			

Plant Species	Seeding Rate *		Soil Drainage Class of Mix	Shade Tolerance of Mix	Comments
	lb/ac	lb/1,000 sf			
Dikes, Dams, Ponds					
1. Creeping red fescue	20	0.5	Well-Moderately Well	Good-Fair	
Perennial ryegrass	5	0.1			
Redtop	2	0.05			
White clover (opt.)	4	0.1			
2. Creeping red fescue	15	0.3	Well-Moderately Well	Poor	In lieu of birdsfoot trefoil, substitute with 4 lb/ac of white clover on well to moderately well drained soils or alsike clover on somewhat poorly drained soils.
Smooth bromegrass	15	0.3			
Redtop or	2	0.05			
Perennial ryegrass	5	0.1			
Birdsfoot trefoil (opt.)	8	0.2			
Recreation areas, Low maintenance areas/turf					
1. KY bluegrass	15	0.3	Well-Moderately Well	Good-Fair	Increase ration of red fescue to Kentucky bluegrass and add hard fescue for shadier sites.
Creeping red fescue	15	0.3			
Perennial ryegrass	5	0.1			
White clover (opt.)	4	0.1			
2. Creeping red fescue	20	0.5	Well-Moderately Well	Good-Fair	
Perennial ryegrass	5	0.1			
Redtop	2	0.05			
White clover (opt.)	4	0.1			
3. Hard fescue	15	0.3	Well-Moderately Well	Good	Low growing mix, use at 1/3 rate or lower with wildflowers, add 10 lb/ac of sheep fescue on gravel areas.
Chewings fescue	15	0.3			
Creeping red fescue	15	0.3			
Perennial ryegrass (turf type)	5	0.1			

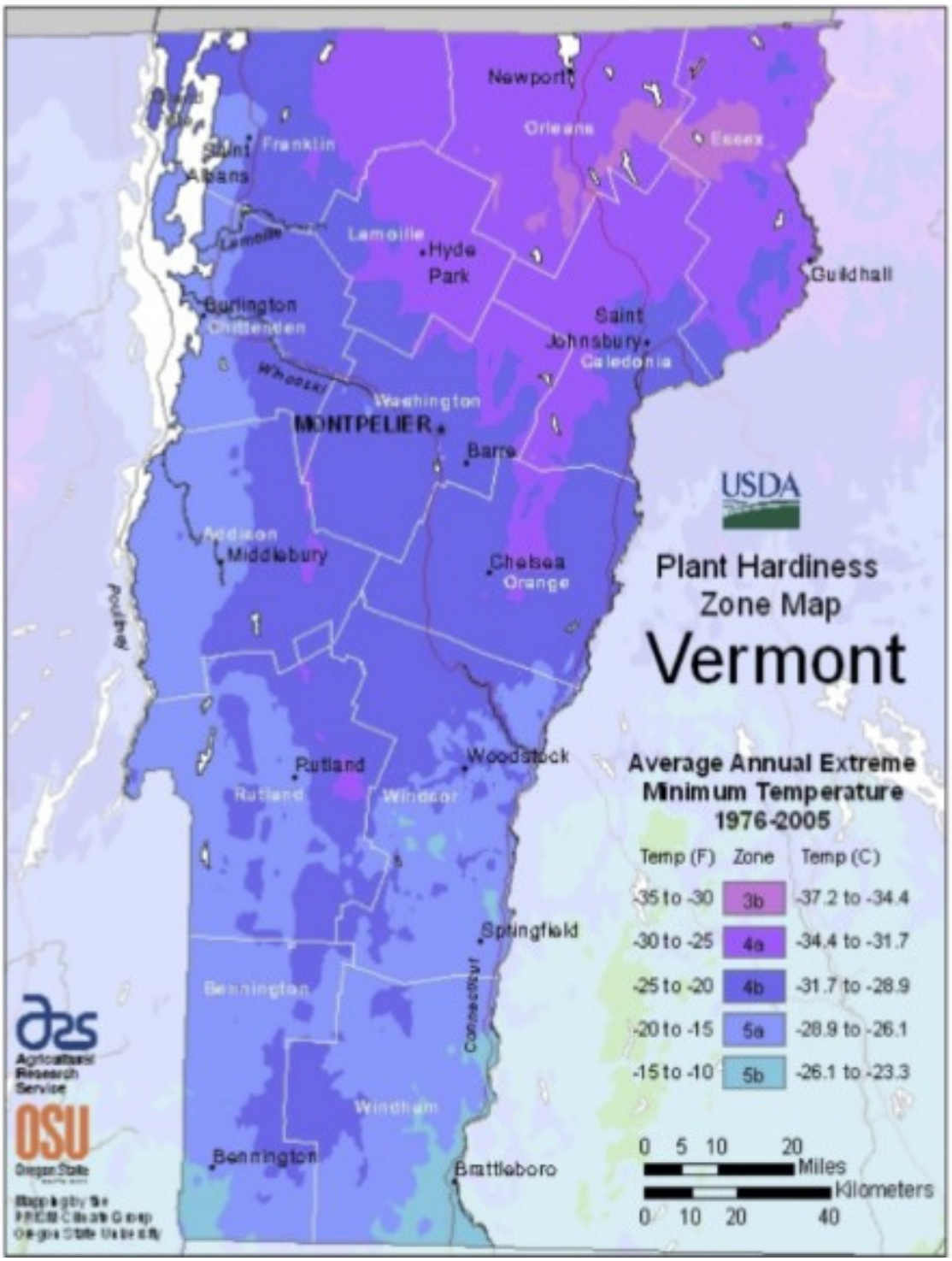
* Seeding rates for the warm-season grass are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. No adjustments are necessary for the cool-season grasses.

TABLE 3: Warm Season Grass Cultivar Recommendations for Vermont		
Cultivar	**Origin State**	**USDA Plant Hardiness Zone in Vermont***
Big Bluestem (*Andropogon gerardii*)		
Niagara	New York	3,4,5
Little Bluestem (*Schizachyrium scoparium*)		
Camper	Nebraska	4,5
Sand Bluestem (*Andropogon halli*)		
Goldstrike	Nebraska	3,4,5
Deertongue (*Dichanthelium clandestinum*)		
Tioga	New York	3,4,5
Eastern Gamagrass (*Tripsacum dactyloides*)		
Pete	Kansas	4,5
Sideoats Grama (*Bouteloua curtipendula*)		
El Reno	Kansas	4,5
Trailway	Nebraska	3,4
Indiangrass (*Sorghastrum nutans*)		
NE-54	Nebraska	3,4,5
Sand Lovegrass (*Eragrostis trichodes*)		
NE-27	Nebraska	3,4,5
Coastal Panicgrass (*Panicum amarum var. amarulum*)**		
Atlantic	Virginia	6,7
Switchgrass (*Panicum virgatum*)		
Trailblazer	Nebraska	3,4

This table is adapted from Vegetating with Native Grasses in Northeastern North America USDA-NRCS and Ducks Unlimited Canada (1988).

*Trials have shown that from an adaptability standpoint, some warm season grasses can be moved along latitudinal lines and within plant hardiness zones. In some instances disease susceptibility could be an issue.

**This is the only cultivar of coastal panicgrass. It is not reliably winter hardy north of central Pennsylvania, PHZ6. However, it is often used as a temporary companion throughout the region due to its good seedling vigor, especially on droughty sites.


Newport
Orleans
Essex
Franklin
Lamoille
Hyde Park
Guildhall
Burlington
Chittenden
Saint Johnsbury
Caledonia
Washington
MONTPELIER
Barre
USDA
Addison
Middlebury
Chelsea
Orange
Plant Hardiness Zone Map
Vermont
Rutland
Woodstock
Windsor
Average Annual Extreme Minimum Temperature 1976-2005
Springfield
Bennington
Windham
Brattleboro
Temp (F) Zone Temp (C)
-35 to -30 3b -37.2 to -34.4
-30 to -25 4a -34.4 to -31.7
-25 to -20 4b -31.7 to -28.9
-20 to -15 5a -28.9 to -26.1
-15 to -10 5b -26.1 to -23.3
0 5 10 20 Miles
0 10 20 40 Kilometers
Agricultural Research Service
OSU

Specific Site Requirements