

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CRITICAL AREA PLANTING

(Ac.)
CODE 342

DEFINITION

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.

PURPOSE

Stabilize stream and channel banks, and shorelines.

Stabilize areas with existing or expected high rates of soil erosion by wind or water.

Rehabilitate and revegetate degraded sites that cannot be stabilized using normal establishment techniques.

Stabilize coastal areas, such as sand dunes and riparian areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to highly disturbed areas such as:

- active or abandoned mined lands;
- urban conservation sites;
- road construction areas;
- conservation practice construction sites;
- areas needing stabilization before or after natural disasters such as floods, hurricanes, tornados and wildfires;
- eroded banks of natural channels, banks of newly constructed channels, and lake shorelines;
- other areas degraded by human activities or natural events.

CRITERIA

**General Criteria Applicable To All Purposes
Site Preparation.**

A site investigation shall be conducted to identify any physical, chemical, or biological conditions that could affect the successful establishment of vegetation.

Evaluate the site's potential for invasion by undesirable plants during practice planning and design. Monitor planted and adjacent areas to enable early detection and control of invasive plants.

Areas to be planted will be cleared of unwanted materials and smoothed or shaped, if needed, to meet planting and landscaping purposes.

A suitable seedbed shall be prepared for all seeded species. Compacted layers will be ripped and the soil re-firmed prior to seedbed preparation.

Available soil should be identified, salvaged and stored by horizon prior to disturbance. Care needs to be taken that earth-moving equipment not uncover or redistribute on-site toxic materials. Toxic materials should be buried prior to site preparation.

To maintain biological attributes, topsoil should not be stored longer than two years. Sites that are unsuitable for vegetative establishment should be covered with a minimum of 4 inches of topsoil if possible. Topsoil should be spread evenly over the subsoil. If particle sizes are significantly different between subsoil and topsoil surface interfaces, mixing should occur to facilitate water percolation and root penetration. Sites reshaped with heavy equipment may have a smooth hard surface and soil compaction making it difficult to prepare a good seedbed. Disking, ripping or

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#).

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other treatment may be necessary to prepare the site for seeding. During site preparation, all debris that could potentially interfere with the normal seeding operation should be removed.

Many critical area soils are low in most plant nutrients and should be tested for fertilizer recommendations. Fertilizer will be applied according to recommendations determined from a soil test. See the Nutrient Management standard in the Field Office Technical Guide. Caution should be used when recommending nitrogen application during establishment years, as the additional nitrogen may benefit more aggressive weed species. Phosphorus is often critical to stand establishment when legumes are being seeded.

When soils are coarse sandy, gravelly or granitic, or when water quality will be adversely affected, reduce fertilizer rates.

Follow up applications of fertilizer will be applied when needed and will be based on a soil test completed within the previous 5 years.

Prepare a firm, clean, weed-free seedbed prior to seeding. A seedbed is considered firm when the boot heel imprint of an average person leaves a maximum impression in the soil of no more than ½ inch. On sites where equipment cannot be operated, the seedbed will be prepared by hand. Broadcast seeding should be on freshly roughened soil surfaces.

The horizontal indentations left by tracked equipment may provide a suitable broadcast or drill planting site on steep slopes.

Follow Wyoming Plant Material Technical Notices 14 and 15 for seedbed preparations and implementation.

Species Selection. Species selected for seeding or planting shall be suited to current site conditions and intended uses, and be resistant to diseases or insects common to the site or location.

Adapted varieties and recommendations for planting rates, methods and dates obtained from Wyoming Plant Material Technical Notice #3.

Selected species will have the capacity to achieve adequate density and vigor to stabilize the site within an appropriate period.

All seed and planting materials will meet with current Wyoming State seed laws and regulations. Refer to Section I, Laws, Field Office Technical Guide.

Do not plant federal, state, or locally designated or noxious species.

When broadcast seeding, a freshly roughened surface will accommodate seed catchment. The seed will be covered by use of hand raking or by dragging harrows, chains or other suitable equipment over the surface or mulched to cover the seed where practical. Specified seed, methods of planting and date of planting shall be in accordance with Wyoming Plant Materials Technical Note #3. The planting rates for a Critical Area Planting will be double the rates listed in the Technical Note. If seeding is to be completed by broadcast methods or hydroseeding, seeding rates must be double the critical area planting rate. (That would be 4x the seeding rate from Plant Material Technical Note #3.) If planting will be harrowed and packed after broadcasting, standard seeding rates may be used.

Nurse crops will not be used.

Temporary cover crops can be used for up to two years where cover is needed. If construction is delayed on a site that has been disturbed, or will be re-disturbed in the near future, temporary cover crops can be used to protect the site against erosion or stabilize the site for eventual permanent vegetation establishment. In the latter situation, the cover crop must be clipped or chemically terminated prior to seed set to control volunteer competition to new seedlings. Refer to the Conservation Cover or Cover Crop standards.

Establishment of Vegetation. Seeds will be planted using the method or methods best suited to site and soil conditions.

Drills will have agitators and other equipment needed to assure uniform seeding. Rice hulls and other dilutants will be used when determined necessary by the planner. Drilling will be on the contour or across slope where practical.

Species, rates of seeding or planting, minimum quality of planting stock (e.g. pure live seed

(PLS) or stem caliper), method of seedbed preparation, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Seeding or planting shall be done at a time and in a manner that best ensures establishment and growth of the selected species. Planting dates for adapted varieties can be obtained from Wyoming Plant Material Technical Notice #3

What constitutes successful establishment (e.g. minimum percent ground/canopy cover, percent survival, stand density) shall be specified before application. Plant densities of 3-10 plants per square foot for grasses and 1-5 plants per square foot for shrubs are desirable. However, judgment should be used when assessing stand adequacy on shallow, drought-prone sites, or sites where other limitations compromise stand establishment.

All seedlings will be protected from grazing by domestic animals and other disturbances until stand establishment. Seeded species may be considered established when they are well rooted (not easily pulled out of the ground by hand) and/or are producing reproductive stems. A minimum of one full growing season is recommended. Establishment weed control will be by clipping or labeled herbicides.

Apply soil amendments (e.g. lime, fertilizer, compost) according to the requirements in the University of Wyoming Guide to Wyoming Fertilizer Recommendations.

Plantings shall be mulched as necessary to ensure establishment. Other disturbed areas shall be mulched as necessary to prevent erosion. Straw is the preferred mulch but needs to be anchored in place with equipment such as rollers and crimpers. Tackifiers, woven netting, and other covers can be used to anchor mulch when slopes are too steep to use equipment on the site.

Wheat straw deteriorates less rapidly and results in less volunteer growth compared to barley straw. Use clean straw to minimize spread of noxious weeds.

Apply 10 lbs. of actual nitrogen per ton of straw to compensate for potential nitrogen immobilization during the mineralization process.

Woven, fabric, and artificial mulches can also be used.

A split hydromulch, hydroplanting operation is recommended on suitable sites. Seed and fertilizer should be applied first to optimize seed to soil contact, and then the mulch is hydromulched over the site.

When plantings are to be irrigated, use nonerosive methods to maintain adequate moisture in at least the upper six (6) inches of soil during the first four (4) weeks and then in the upper 12 inches until the end of the growing season. Seedlings may be susceptible to excessive irrigation during establishment.

See the Mulching Standard (484) in the Field Office Technical Guide for further information.

Sod placement shall be limited to areas that can naturally supply needed moisture or sites that can be irrigated during the establishment period.

Sod will be placed and anchored using techniques to ensure that it remains in place until established.

When using sod, the surface will be smoothed so air pockets will not form beneath the sod.

Sod strips will be fit closely together and tamped tightly in place. Sod will be staked down as needed to protect from movement on steep slopes.

Cut sod will be kept moist. The maximum time period between cutting and placement will not exceed 96 hours.

Areas covered with sod will be adequately irrigated until sod has become well established. Certain species may require permanent irrigation to maintain adequate cover.

Table 1 – Adapted Sod Species

Introduced Species	Native Species
Creeping Foxtail	Western Wheatgrass
Reed Canarygrass	Prairie Sandreed
Intermediate Wheatgrass	Slender Wheatgrass

Pubescent Wheatgrass	Streambank Wheatgrass
Kentucky Bluegrass	Thickspike Wheatgrass
Smooth Bromegrass	

Dryland sites that receive less than 18 inches of precipitation will not be sodded.

Dryland sites that receive greater than 18 inches of precipitation will be sodded early spring to May 1.

Irrigated sites will be sodded early spring to September 1.

Additional Criteria to Stabilize Stream and Channel Banks and Shorelines

When slopes are modified for seeding, topsoil will be stockpiled and spread over areas to be planted as needed to meet planting and landscaping needs.

Bank and Channel Slopes. Channel side slopes shall be shaped so that they are stable and allow establishment and maintenance of desired vegetation.

Slopes steeper than 2:1 shall not be stabilized using vegetation alone. A combination of vegetative and structural measures will be used on these slopes to ensure adequate stability.

Species Selection. Plant material used for this purpose shall:

- adapted to the hydrologic zone (see Fig. 1) into which they will be planted.
- be adapted and proven in the regions in which they will be used.
- when mature, produce plant communities that are compatible with those in the area.
- protect the channel banks but not restrict channel capacity.

Establishment of Vegetation. The species used, planting rates, spacing, and methods and dates of planting shall be based on plant materials' technical notes.

When considering bioengineering techniques for protecting critical areas, refer to Engineering Field Handbook, Chapter 18.

When establishing and maintaining vegetation on channel banks, berms, spoil and associated areas, follow the Channel Bank Vegetation standard in the Field Office Technical Guide and Wyoming Plant Material Technical Notes #2 and #8. The acceptable time period for obtaining woody cuttings from host plants and when woody cuttings will be planted is listed on the web site
<http://nativeplants.for.uidaho.edu/>

Where woody plantings will be installed, the critical area will first be stabilized with herbaceous cover as noted in the previous section and broadleaf weeds controlled with labeled herbicides. Planting of woody species will be in accordance with Tree/Shrub Establishment in the Field Office Technical Guide. In most cases, trees and shrubs will be planted randomly rather than in a pattern following herbaceous plant establishment. This will allow the use of selective herbicides for broadleaf weed control during grass establishment. A map indicating planted areas should be developed to document the location of the plants for avoidance during routine maintenance operations.

Identify, mark, and protect desirable existing vegetation during practice installation.

A combination of vegetative and structural measures using living and inert material shall be used when flow velocities, soils, and bank stability preclude stabilization by vegetative establishment alone.

If the existing vegetation on a site will compete with species to be established vegetatively (e.g. bare-root, containerized, ball-and-burlap, potted), it will be controlled in a manner that ensures the successful establishment of the planted species.

Site Protection and Access Control.

Grazing animal access to planted areas will be controlled for a minimum of two growing seasons during the establishment period.

All areas to be grazed will have a grazing plan that meets the criteria in the local Field Office Technical Guide.

Grazing shall be permanently excluded on high hazard sites, such as cut banks, areas of seepage or other potentially unstable areas.

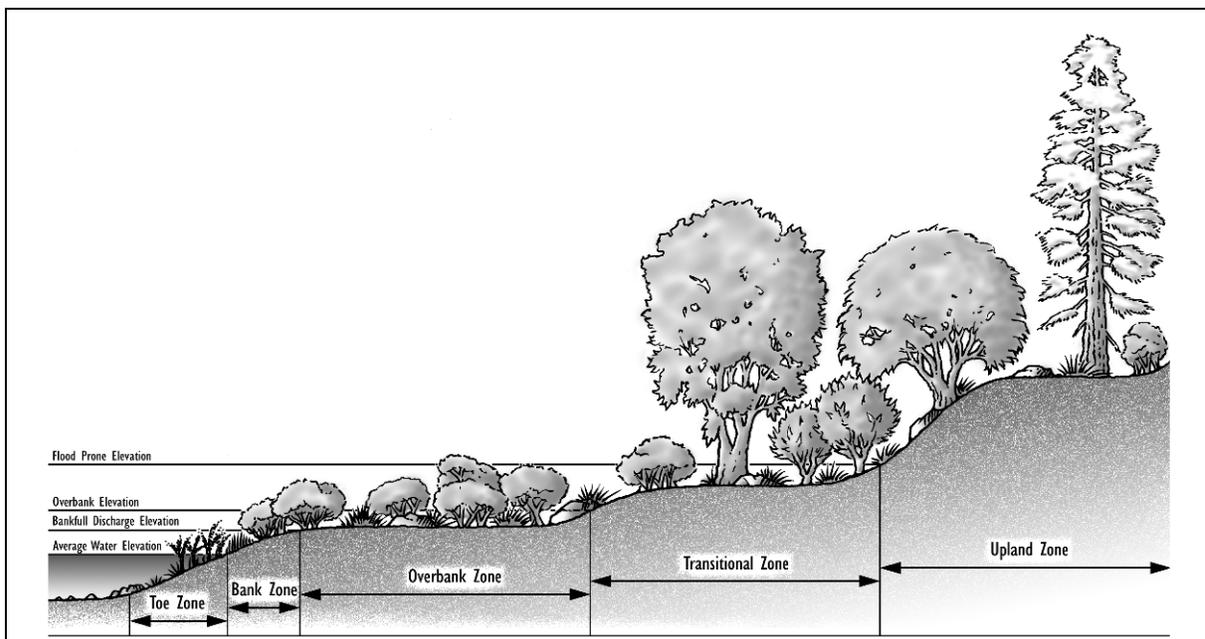


Figure 1. Location of hydrologic zones along a channel or shoreline.

Definitions and descriptions of hydrologic zones used for channels and shorelines:

Bankfull Discharge Elevation - In natural streams, it is the elevation at which water fills the channel without overflowing onto the flood plain.

Bank Zone - The area above the Toe Zone located between the average water level and the bankfull discharge elevation. Vegetation may be herbaceous or woody, and is characterized by flexible stems and rhizomatous root systems.

Overbank Zone - The area located above the bankfull discharge elevation continuing upslope to an elevation equal to two thirds of the flood prone depth. Vegetation is generally small to medium shrub species.

Toe Zone - The portion of the bank that is between the average water level and the bottom of the channel, at the toe of the bank. Vegetation is generally herbaceous emergent aquatic species, tolerant of long periods of inundation.

Transitional Zone - The area located between the overbank zone, and the flood prone width elevation. Vegetation is usually larger shrub and tree species.

Upland Zone - The area above the Transitional Zone; this area is seldom if ever saturated.

Note: some channels or shorelines have fewer than four hydrologic zones because of differences in soils, topography, entrenchment and/or moisture regime.

Additional Criteria to Rehabilitate and Revegetate Degraded Sites that Cannot Be Stabilized through Normal Farming Practices.

If gullies or deep rills are present, they will be filled and leveled as necessary to allow equipment operation and ensure proper site and seedbed preparation.

Based on a soil test and other appropriate site evaluations, soil amendments will be added as necessary to ameliorate or eliminate physical

or chemical conditions that inhibit plant establishment and growth.

Additional Criteria to Restore Coastal Areas, such as Sand Dunes and Riparian Areas

Plants for sand dunes and coastal sites must be able to survive being buried by blowing sand, sand blasting, salt spray, salt water flooding, drought, heat, and low nutrient supply.

Adapted varieties and recommendations for planting rates, methods and dates obtained from Wyoming Plant Material Technical Notice #3.

Sand trapping devices such as sand fences or brush matting shall be included in the revegetation/ stabilization plans where applicable.

CONSIDERATIONS

Species or mixes that are adapted to the site and have multiple values should be considered. Native species may be used when appropriate for the site.

Consider including adapted sage species or subspecies when seeding suitable sites that could serve as sage-grouse habitat.

To benefit pollinators and other wildlife, flowering shrubs and wildflowers with tough root systems and good soil holding capacity also should be considered for incorporation as a small percentage of a larger grass-dominated planting. Where appropriate consider a diverse mixture of legumes and forbs to support pollinator habitat.

Avoid species that may harbor pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Planning and installation of other conservation practices such as Diversion (code 362), Obstruction Removal (code 500), Subsurface Drain (code 606), or Underground Outlet (code 620) may be necessary to prepare the area or ensure vegetative establishment.

Areas of vegetation established with this practice can create habitat for various type of wildlife. Maintenance activities, such as mowing or spraying, can have detrimental effects on certain species. Perform management activities at the times and in a manner that causes the least disruption to wildlife.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or management unit according to the criteria and operation and maintenance sections of this standard. This and other pertinent information shall be recorded on specification

sheets, job sheets, in practice narratives in conservation plans.

The following elements shall be addressed in the plan, as applicable, to meet the intended purpose.

- Site preparation
- Topsoil requirements
- Fertilizer application
- Seedbed/planting area preparation
- Methods of seeding/planting
- Time of seeding/planting
- Selection of species
- Seed/plant source
- Seed analysis
- Seeding rate/plant spacing
- Mulching
- Supplemental water needed for establishment
- Protection of plantings

OPERATION AND MAINTENANCE

Use of the area shall be managed as long as necessary to ensure the site remains stable.

Maintenance needed for this practice includes:

1. Periodic inspection and evaluation of vegetation to determine maintenance needs.
2. Control of noxious weeds by appropriate recommended means.
3. Replanting due to drought, fire, insects or other events that prevented adequate stand establishment should be addressed within 1-3 years of planting. Recommendations may vary from complete re-establishment to over seeding or spot planting.
4. If Use Exclusion is not a planned component, than Prescribed Grazing and/or Forage Harvest Management as located in Section IV eFOTG (Field Office Technical Guide) will be applied to an established planting.
5. Repair of appurtenances and fences.

Usage of the critical area should be avoided during periods of vegetative establishment, and usage thereafter should be minimal and based on the physiological condition of the vegetation. After establishment, the management of the area should comply with the Conservation System Guides for the planned land use. (Section III, eFOTG). The site may require permanent protection from both domestic livestock and wildlife. Refer to the Fence standard in the eFOTG.

REFERENCES

Federal Interagency Stream Restoration Working Group. 1998. Stream corridor restoration: principles, processes, and practices. National Engineering Handbook, Part 653.

Memorandum of Understanding between the USDA, NRCS and the State of Wyoming, Wyoming Game and Fish Commission. August 11, 2010.

NRCS Field Office Technical Guide (eFOTG), Section I, B. References List, 11. Technical Notes by Discipline, Plant Material Technical Notes
http://efotg.sc.egov.usda.gov//efotg_locator.aspx

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