POST CONSTRUCTION ESTABLISHMENT OF VEGETATION

PURPOSE

This fact sheet is intended to give applicants basic information on establishing vegetation where construction activities have disturbed or removed natural stabilizing vegetation from the streamside environment. Establishment or reestablishment of vegetation adjacent to natural stream channels can be a complex process and not all projects meet with high degrees of success. This fact sheet will serve only as an introduction to the topic and refer the reader to other, more detailed publications and services that will assist in planning and initiating projects that will have high degrees of success.

IMPORTANCE OF VEGETATION

Background

It goes without saying that the majority of construction projects are messy. Heavy equipment such as bulldozers and trackhoes are highly effective at not only disturbing and destroying plants, but also completely changing landscapes. Stream alteration construction projects are no different in their impacts, however, these impacts become exceedingly more problematic in natural stream environments. Critical habitat loss, water quality degradation, and excessive erosion are all possible when projects involve the removal and disturbance of vegetation near streams. Therefore, it is extremely important that those planning these projects keep impacts to an absolute minimum and mitigate these impacts as soon as possible following construction activities.

Riparian areas (vegetation communities associated with natural streams) and wetland areas represent less than 2% of the total land area in the intermountain west yet provide habitat for more than 80 % of wildlife (McKinstry, et. al, 2003) and are critical for providing cool, clean water to water users. The State of Utah through the State Engineer's Office is committed to ensuring that stream alteration projects result in minimum impacts to this important resource and will require that vegetation be reestablished in almost every stream alteration permit issued.

Functions and Associated Values

As alluded to above, riparian and other streamside vegetation serve several important functions.

Erosion Resistance. Vegetation is critical in reducing surface water runoff and resultant erosion. This is accomplished via precipitation capture on leaves, creation of greater infiltration rates, and evapotranspiration. It has been estimated that naturally well-vegetated areas can reduce surface water runoff by as much as 50% as compared to areas lacking vegetation or where soils are compacted (Barr Engineering Co., 2001). Additionally, native grasses and riparian trees and shrubs often have very deep root systems that are very effective at increasing soil strength and stability. When natural steams flood and the erosive power of water is high, these root systems increase the erosional resistance of stream banks and prevent loss of soil and property. Finally, riparian vegetation inundated by floodwaters can act to reduce flow

velocities and therefore reduce the erosive power of water.

Improvement of Water Quality. Aside from reducing total suspended sediment from stream flow as described above, riparian vegetation can also reduce contaminants and nutrient loading to streams via uptake and utilization through the root system. Nitrogen and phosphorous are among the contaminants that can be reduced in concentration by healthy riparian systems.

Creation/Enhancement of Habitat. Healthy riparian vegetation provides habitat for several threatened and/or endangered avian species throughout the state of Utah. The Southwestern willow flycatcher (*Empidonax trailii extimus*) and yellow-billed cuckoo (*Coccyzus americanus*) typically nest in riparian vegetation near perennial streams in the southern portion of Utah. Riparian vegetation also provides hiding cover for fish and shading to reduce water temperature in valuable trout fisheries.

Esthetics. Though a subjective function, most people enjoy healthy, well vegetated near stream environments and the wildlife that utilize them.

PLANTING ZONES

Before embarking on any re-vegetation effort, it is important to understand that not all areas adjacent to natural streams will be subject to the same conditions. Differences in soil type, water availability, and water velocity will dictate what type or types of vegetation are most suited for a particular area adjacent to a natural stream. This section describes these areas or zones and the type of conditions that we would expect to encounter there. Please be aware that these zone classifications represent an ideal stream system. Not all of these zones may be present adjacent to a particular natural stream. All information presented below is taken from the Riparian/Wetland Project Information Series No. 16. Full references are given at the end of this fact sheet.

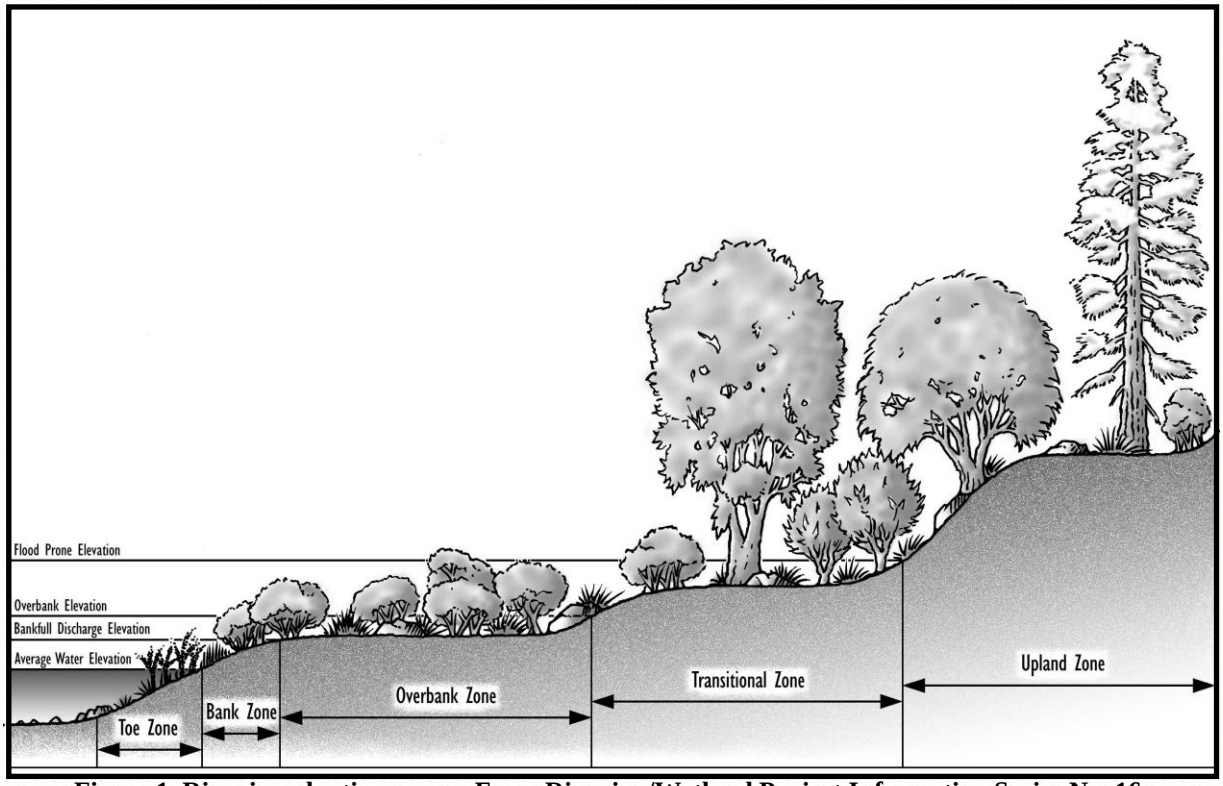

Figure 1. Riparian planting zones. From Riparian/Wetland Project Information Series No. 16.

Toe Zone. This zone is located below the average water elevation of the stream. In general, little vegetation can exist in this area due to it being frequently inundated by water. This area is also characterized by the highest water velocities and associated erosive power. Some wetland plants will survive in these areas provided water velocities are low.

Bank Zone. This zone is located above average water elevation and bankfull elevation and is characterized by less frequent inundation and lower velocities than the Toe Zone. This zone will be completely submerged on an average of once every 1.5 years. Typical vegetation in the Bank Zone includes supple stands of low growing willows and colonizing herbaceous species.

Overbank Zone. This zone exists from the bankfull discharge elevation to the overbank elevation. This zone is contemporaneous to the floodplain. Because this zone can be inundated as often as every other year, vegetation must be flood tolerant. Typical plant types in the Overbank Zone include supple, low growing willows, herbaceous vegetation, and low growing riparian, flexible stemmed shrubs. Larger plant species with inflexible stems in this zone may hinder the stream channel's ability to successfully convey flood flows.

Transitional Zone. This zone can be found above the overbank elevation and below the flood prone area. Flood waters may only inundate this area approximately once every 50 years. Vegetation typical in this area include riparian tree and shrub species grading into upland species toward the top of this zone. Upland Zone. This zone exists above the flood prone elevation and is typified by upland vegetation species. Though not inundated by flood flow, erosion resistance from well established upland vegetation will reduce overland flow and associated sedimentation to the natural stream.

PLANT SPECIES

Table 1 gives a sampling of the plant species that may be found in each of the planting zones listed above within the state of Utah. As climatic and elevation differences will influence different plant species, other sources should be consulted for a particular stream course

PLANTING ZONE	TYPICAL SPECIES
Toe Zone	Hardstem bulrush (*Scirpus acutus*) Baltic rush (*Juncus balticus*)
Bank Zone	Coyote willow (*Salix exigua*) Hardstem bulrush (*Scirpus acutus*) Baltic rush (*Juncus balticus*)
Overbank Zone	Coyote willow (*Salix exigua*) Woods rose *(Rosa Woodsii*) Red-osier dogwood (*Cornus stolonifera*) Thinleaf alder (*Alnus incana*)
Transition Zone	Red-osier dogwood (*Cornus stolonifera*) Fremont cottonwood (*Populus fremontii*) Narrowleaf cottonwood (*Populus augustifolis*) Woods rose *(Rosa Woodsii*) River birch (*Betula occidentalis*)

	Peachleaf willow (*Salix amygdaloides*) Bigtooth maple (*Acer grandidentatum*) Box elder (*Acer negundo*) Thinleaf alder (*Alnus incana*)
Upland Zone	Big sage (*Artemisia tridentate*) Thickspike wheatgrass (*Elymus lanceolatus*) Western wheatgrass (*Pascopyrum smithii*) Rubber rabbit brush (*Chrysothamnus nauseosus*) Gambel Oak (*Quercus gambelii*)

Table 1. Typical plant species associated with planting zones. Sources of plant information are listed in the references section of this fact sheet.

PLANTING TECHNIQUES

When seeding and planting in areas adjacent to natural streams it is necessary to consider the following:

Time of year. Often seeding and planting is best accomplished in the fall and early spring months when temperatures are low and soil moisture is optimum. If planting or seeding is to occur in summer months, the use of temporary irrigation may be necessary to establish vegetation.

Soil conditions. If the disturbed area has been compacted by heavy equipment it will be necessary to loosen soils via tilling to a depth of 18 to 24 inches (Barr Engineering Co, 2001).

Need for immediate erosion protection. This may be a common problem in steep bank and overbank areas adjacent to streams. In these cases, it may be necessary to install temporary, biodegradable fiber mats or use mulch to minimize surface runoff. On some slopes, water bars and/or silt fencing may be needed to prevent erosion.

Fertilization. Fertilizer is generally not needed for establishment of native species that are already well adapted to local soils. Fertilization may be detrimental in that it may promote invasion by non-native plant species and overload the nearby stream with nutrients.

Maintenance. For seeded areas, it is important that soils remain moist until plants are established. Long-term maintenance should involve regular inspections to ensure the majority of vegetated areas are successfully established. During these inspections non-native invasive species should be noted and removal should occur as soon as possible. The State Engineer's Office generally recommends a monitoring and maintenance period of at least three growing seasons.

FOR MORE INFORMATION

As mentioned before, this fact sheet is intended to serve as an introduction to post construction establishment of vegetation. Below is a listing of sources of more information and assistance for topics addressed in this fact sheet.

Sources of plants and seeds:

- Granite Seed, Lehi, Utah
- Lone Peak Nursery, Draper, Utah
- Local nurseries specializing in native plant and seed.

Sources for additional plant species information, information on planting techniques, and bioengineering methods:

The Natural Resources Conservation Service Aberdeen Plant Materials Center. Visit their website at: http://plantmaterials.nrcs.usda.gov/idpmc/publications.html#PU

REFERENCES

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