Article 98

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Practical Tips for Establishing Freshwater Wetlands

No shortage of books and manuals exist to design freshwater wetlands for mitigation, restoration or stormwater treatment. A recent series of articles by Garbisch and others, however, suggest that successful establishment of freshwater wetlands often hinges on writing practical and thorough construction specifications for the contractor who implements the design. Lack of attention to these important details can lead to serious problems in establishing a dense and diverse freshwater wetland.

Ed Garbisch founded the nonprofit corporation **Environmental Concern** (EC) in 1972 to educate, research, develop, and apply technology for the restoration and construction of wetlands. Over this period, EC has been involved in hundreds of tidal and non-tidal wetland establishment projects and has gained a great deal of experience in wetland propagation and creation techniques. Some of the practical lessons they have learned on how to construct successful wetlands are summarized in Table 1.

Matching the design hydrology of the planned wetland with the appropriate wetland plant species is perhaps the most critical task in the design of diverse pondscapes. However, many wetland construction drawings fail to even show the design hydrology on the plan. Without a good understanding of the future water surface elevations and the frequency of inundation it is nearly impossible make the right match. Therefore, it is important to clearly show design hydrology on all construction drawings (plan view and cross section).

Another frequently encountered problem is that while the planting plan may contain an extensive wetland plant list, most of the species may not be available in quantity from local wetland nurseries at the time of construction. As a consequence, plant species are substituted at the last minute that may not meet the

Table 1: Useful Construction Specifications for Freshwater Wetlands (Garbisch, 1993, 1994)

1. Always clearly specify the proposed wetland hydrology on construction plans and drawings to ensure that proper wetland plants are selected. Be wary of wetland projects that only rely on groundwater for water supply.
2. Consider procuring wetland plants through growing contracts with wetland nurseries. These contracts ensure that the desired species and quantities of wetland plants will be available to implement the planting plan.
3. Use care before automatically requiring topsoil amendments to prepare the substrate for planned wetlands. Topsoiling may not always be needed, can be expensive and may introduce undesirable species from the seedbank.
4. Although it is very important to quickly stabilize disturbed upland areas during construction, avoid specifying the use of Tall Fescue for this purpose, because of its allelopathic character.
5. Be careful when specifying hydroseeding to establish stormwater and other types of wetlands without strong confidence that seeds will germinate and root in the substrate before the site is inundated. Otherwise, both mulch and seeds will float away or be unevenly distributed through the marsh.
6. If seeding is to be used as the key propagation method to establish the wetland, be sure to specify the quantity of pure live seed needed, the commercial source of seed, seeding technique, filler, and window and other key aspects leading to a successful result.
7. Clearly specify watering requirements during the first growing season for seasonally or temporarily inundated wetland areas. Drought conditions can severely reduce growth and survivorship for these wetlands without initial watering by truck or by a shallow aquifer well.

original intent of the wetland plan. A new approach has been developed to ensure that the species and quantities of wetland plants are available at the time of construction.

This approach is termed *contract growing*. It involves executing an advance contract with a wetland nursery to grow and deliver a specified number and species of plants at a future date. An up-front deposit of 20 to 30% is normally required prior to growing. While contract growing means more planning and logistics, the practice does provide a better guarantee that the planned and most desirable wetland plant species will be available when needed.

Garbisch also questions the common specification to topsoil the surface of created herbaceous wetlands prior to planting. Topsoiling can be expensive, and may not always be needed at most sites. This is due to the fact that herbaceous wetland plants typically produce a great deal of below-ground organic matter and quickly dominate the composition of the substrate within a few years. Garbisch does suggest topsoiling in clay, rock, or pyritic soils and topsoiling or soil amendment for forested or scrub shrub wetlands. But generally, soil tests should be performed before recommending topsoil at a particular site.

Most wetland plans devote a great deal of attention to the selection of wetland plant species, but give relatively little thought to the ground covers used to vegetate disturbed areas around the pond or wetland. Many plans simply specify that these areas be stabilized through hydroseeding of KY-31 Tall Fescue *(Festuca aruninacea)*. Fescue has been widely specified for years for erosion control during and after construction. It does an admirable job of quickly establishing a dense turf cover. This cool season bunch grass also tolerates a wide range of moisture conditions and can invade many areas of the site.

Burchick (1993) questions the wisdom of specifying Tall Fescue as a ground cover around wetlands and ponds. He argues that Fescue frequently displaces native grass and meadow species, out-competes natural or planted tree seedlings, and can even invade portions of the wetland. Fescue is a tough competitor partly due to its allelopathic characteristics. It secretes organic acids that can impair the germination of native species. Consequently, Burchick recommends that less aggressive cool season grasses be utilized for erosion control purposes around pond and wetland areas.

Direct seeding is often the most economical technique to establish wetlands. Garbsich cautions that construction specifications should be very tight if direct seeding is called for. For example, many wetland seed mixes have relatively low purity and germination rates. Consequently, Garbisch observes that if a pound of pure, live seed is needed to establish a ground cover per unit area, and it has a 10% germination rate and 50% purity, then some 20 pounds will actually need to be broadcast to achieve the desired coverage. Consequently, it is recommended to express direct seeding rates in terms of pure, live seed (pls). The specifications should either require that the source(s) of the seed be indicated, or require that they be field collected and tested for purity and germination rate.

Of equal importance are the seeding *window* and *filler*. The window is the optimal seasons and dates for a successful result. The filler represents the sand dilution needed for small seeds to ensure they are uniformly distributed over the planting area. Seeding specifications should also clearly state the technique and implements for the seeding operation, and whether this operation will be done in the wet or the dry. Hydroseeding of wetlands should be avoided unless the contractor has confidence that the seeds will germinate and root before the next runoff event. Otherwise, the mulch, tack and seeds will float away or become unevenly distributed.

The establishment of a dense and diverse wetland is the joint product of the design engineer, landscape architect, wetland nursery, and planting contractor. Thoughtful and clear construction specifications help assure that each individual performs his or her role well.

—TRS

References

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