PROMOTING NATIVE SEEDBANK

TECHNICAL GUIDANCE DOCUMENT

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Table of Contents

INTRODUCTION

When restoring drained wetlands, a common vegetation establishment strategy is to use the remnant native seedbank that may exist within the wetland substrate. The native seedbank can provide a local source of wetland plants that will increase the diversity and probability of establishing a functional plant community in the wetland. It is common that seedbank is combined with purchased or locally collected seed to ensure the establishment of a wide range of species.

The viability of the existing remnant seedbank in a drained wetland is often a function of how long the wetland has been drained and in agricultural production. If the wetland has been drained for less than 20 years, some seeds in the seedbank are probably viable (Galatowitsch and van der Valk, 1994). Wienhold and vander Valk (1989) found that less than three wetland species were present in restored prairie potholes that were drained for 40-70 years, five to seven species in those that were drained for 5-30 years, and more than eleven species in wetlands that were never drained. Regardless of the amount of time that a site has been drained and in agricultural production, a test of the remnant seed bank can help determine the re-vegetation potential of the site. See Appendix 5-G for information regarding seedbank testing.

During the summer of 1998, an inspection of 78 wetlands that were restored and created under the Minnesota Wetland Banking program was undertaken (Shaw 1998). A number of species were found to colonize in these wetlands even though these species had not been included in the seeding mix for these projects. Plants that established in the wetlands most likely grew from seeds dispersed from populations in or near the restoration site or were remnant native seeds that were dormant in the wetland substrate. Wet and sedge meadow species commonly observed included fox sedge (Carex vulpinoidea), giant goldenrod (Solidago gigantea), red-stem aster (*Symphyotrichum puniceum*), marsh aster (Symphyotrichum lanceolatum), blue vervain (Verbena hastata), Juncus species. green bulrush (Scirpus atrovirens), Joe-Pye weed (Eupatorium maculatum), boneset (Eupatorium perfoliatum), common bugleweed (Lycopus americanus), marsh milkweed (Asclepias incarnata), Canada blue-joint grass (Calamagrostis canadensis) and wild mint (Mentha arvensis). The inspection also found that seedbank establishment was much more significant in the northern part of the state than the southern part of the state.

A study conducted in northern Iowa suggests that the remnant seedbank could not fully be relied upon for the establishment of many sedge and wet meadow species. The study compared ten restored wetlands to natural wetlands and found that although the vegetation of the emergent zone did not differ significantly between restored and natural wetlands, there were fewer sedge and wet meadow species along the restored wetland fringe (Galatowitsch and van der Valk, 1996). Galatowitsch and Biederman (1998) also found that minimal seed reserves and disproportionately high abundance of invasives (Typha spp., Phalaris arundinacea) may limit the ability of natural wetlands to act as effective propagule sources for re-vegetation during restoration. These results suggest that it is beneficial to plant species that may not establish well from the seedbank into restorations where the remnant native seedbank is being relied on for vegetation establishment.

APPLICATION

Seedbank Testing – An assessment of seedbank potential is often needed to determine appropriate restoration methods. In some cases fields can be left fallow after agricultural production to see what species establish from the seedbank. In other cases it is not feasible to allow fields to grow and a method to test the seedbank is needed. Appendix E of the *Minnesota Wetland Restoration* Guide summarizes a method of seedbank testing that involves collecting samples from different locations and depths at a site and conducting germination tests in greenhouses. This information can help determine if the seedbank may contribute species establishment for a project and what restoration methods may be needed to promote germination.

Supplementing Native Seedbank – Information from seedbank tests can be very useful for decision making about what additional species may be needed. Restoration practitioners often try to ensure that all plant functional groups (asters, legumes, other forbs, cool-season grasses, etc.) are filled for a site. In some cases state seed mixes that have been designed to fill functional groups can be used to determine additional species that may be beneficial. The seeding of additional species can be conducted after other treatments such as scraping, tilling or agricultural harvest is completed.

Planting Temporary Cover Crops - When the use of seedbank is planned for a project it is sometimes beneficial to seed temporary cover crops over areas to prevent erosion until the seedbank can germinate. Oats, winter wheat and slough grass are the most common species used for this purpose. Ryes should be avoided as they can inhibit seed germination. The temporary cover crop will need to be seeded before (or shortly after) hydrology is restored so the site can be accessed with equipment, otherwise hand seeding will be needed.

Slough grass, a wetland temporary cover crop

Sediment Removal and Scraping - The amount of sediment that has covered a wetland can influence the usefulness of a remnant native seedbank for a restoration project. If seeds have been covered by even a few inches of soil, their ability to germinate is doubtful. While the sediment can be scraped away to re-expose the seed, it is difficult to determine the proper depth to excavate. Successful wetland restoration projects have involved the removal of reed canary grass monotypes through scraping, while at the same time exposing the underlying seed bank. When scraping is conducted, the complete root systems of the reed canary grass are removed, allowing for the germination of the underlying seed bank. Another benefit of scraping is that it can remove excess nutrients from a site that can give species such as reed canary grass and narrow-leaf cattail an advantage. Scraping may be costly and permits may be required to excavate within a wetland. Additional discussion on this topic occurs in Section 4-6 Excavations and Shallow Scrapes of the Restoration Guide.

Deep Plowing - The use of plows to access a buried seedbank can be a cost effective strategy to expose seedbank, however, it is still considered experimental and success rates are uncertain. Similar to excavation, it can be difficult to determine the depth of the wetland substrate containing the remnant seedbank and even more difficult to control plow depths since the sediment depths will likely vary throughout the wetland basin. An advantage of deep plowing is that it can turn the soil so that many weed seeds that are currently at or near the wetland surface become buried too deep to germinate. It is also relatively inexpensive. While deep plowing may expose and allow some native remnant seed sources to germinate, additional seeding should be planned to supplement this strategy and help ensure success. Wet soils are often a limiting factor for the use of plows in wetland areas. After plowing, a site should be disked and harrowed to smooth and prepare the seed bed.

Promoting seedbank growth – Weed control is the first step in promoting seedbank establishment and growth. Weeds should be controlled with methods such as herbicide application, tilling, inundation etc. In many cases, only one herbicide application may be desirable to avoid removing native species. The restoration of hydrology should be timed with attempting to restore seedbank. Water levels should then be controlled to promote growth.

OTHER CONSIDERATIONS

In many cases, native seedbanks will not result in a diverse wetland community. The addition of other species is often needed to establish a community that can effectively compete with invasive plants. When native seedbanks are relied on for establishment the site should be monitored frequently to ensure that native species are establishing as planned and that invasive species are not establishing.

COSTS

Practices such as tilling or harrowing to release seebank typically cost between $20 and $40 per acre. Scraping usually involves heavy equipment and costs around $150 to $175 per acre. Using native seedbank can save money for projects by decreasing the amount of seed that needs to be purchased.

ADDITIONAL REFERENCES

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