



## CHAPTER 9. IMPLEMENTING THE RESTORATION

# WETLAND RESTORATION

While each restoration project is unique and has a very specific plan, this chapter outlines some general recommendations and pitfalls to beware of when implementing your wetland restoration. If you choose to hire a contractor, the one you select will be crucial to your restoration's outcome. Poor planning and poor construction are the two most common reasons wetland restoration projects fail, and repairing a poorly constructed project is usually difficult and sometimes impossible.



### Timetables



The permitting process, project size, the kind of work you plan to do, and when contractors can schedule the work will influence your project's timetable. You may easily spend up to a year planning the project and obtaining appropriate permits. An experienced contractor may not want to look at your site until you have your permits in hand; some contractors, however, may be helpful during the design phase.

Earth moving under wet conditions is difficult and time consuming. A good contractor will set the project up in sequence, with all the "dry work" of site preparation and planning conducted first. Once you start restoring water levels you can't turn back.

Construction schedules depend on weather and site conditions. Some wetland soil types can only be worked on during the driest time of the



year, while others are worked in winter when frozen ground can support heavy equipment. You may be able to avoid the cost of using large construction mats for the equipment to rest on (see “Construction Terms” on page 99) if work is done during the right season.

Planting and seeding have timetables as well. Plantings occur in October and November before the ground freezes, or in April and May, after the thaw but before temperatures are high. If a spring planting is planned, seeds need to be “cold stratified” by the supplier. Avoid planting after May since small sprouted seedlings or transplanted plants become stressed or can dry up in summer heat before developing a good root system.

Be prepared to plan around annual variations in local weather. Exceedingly dry years ease construction, but limit prescribed burns, while a wet year or warm winter can delay construction.

## How to Evaluate the Contractor

Perhaps the greatest potential for problems comes from the failure of the contractor to follow the plans. Before hiring anybody, carefully evaluate the contractor’s ability to meet your project’s needs. Seek recommendations of a company or individual from a local Wisconsin DNR or United States Fish and Wildlife Service office, or from a private conservation group with restoration experience. If few wetland projects have been constructed near you, check on firms that do engineering and earth moving for farmers. You should contact several contractors, tell them about your project and have them walk your site with you. Suggested questions include:

### 1. Do they have experience doing wetland restoration work?

What types of projects have they completed? Have they worked with ponds, scrapes, ditch plugs, ditch recontours, drain tile removal, berms, control structures, etc.?

### 2. What kind of equipment do they have?

Most contractors who do wetland work have low ground pressure (LGP) equipment (see Construction Terms on page 99). This “tracked” equipment (usually a backhoe and bulldozer with a wider than normal track) is less likely to compact the soil and can move in wet areas that would mire other equipment. Find out what type of support equipment the contractor uses. Dump trucks, graders, scrapers, and other equipment may be needed during a wetland restoration depending on the site. Each job is unique; some require several pieces of equipment, others require just one.

### 3. Is the equipment big enough to do the job?

You will want equipment large enough to move earth quickly and efficiently. The less time spent during construction the better, especially during restoration of water levels. A contractor may claim that the hourly cost of a smaller machine is less expensive, however, a big machine may quickly prove a financial advantage by being able to work faster and more efficiently.



*Top, low ground pressure backhoes have wide tracks that distribute weight on wetland soils.*

*Bottom, a harrow or drag is attached to an ATV to smooth freshly seeded soil.*



Photos: Jeff Nania

**4. Can the contractor provide at least three references?**

Contact those references. If a contractor doesn't give references, be cautious. There are plenty of others who are more than willing to offer references.

**5. Can the contractor provide a firm price?**

Get it in writing. If the cost exceeds your budget, seek additional bids. Find out if you can save money doing some of the work yourself. Ask the contractor to suggest ways the project could be modified to meet your goals, save equipment time, and cost less. Some contractors may only bid wetland projects on a time-and-material basis (the longer it takes, the more it costs). You may be able to request a clause in your contract that caps costs at a given amount. This establishes the budget for your project and tells the contractor that he must keep track of time and not exceed the set price without your consent.

**6. Will the contractor stay on your site until the job is done?**

You may be able to include a clause in the contract that the contractor must remain on site unless weather conditions require work to stop, or at the written request of the client. Some contractors have been known to drop a wetland job for a larger and more lucrative job, and as a result, it may take up to a year to complete the work.

*Silt fencing contains sediments during wetland restoration.*

**7. Does the contractor use erosion and siltation control and earth stabilization methods?**

Find out what steps the contractor intends to take to prevent erosion and sedimentation, and how disturbed soils, especially slopes, will be stabilized.

**8. Can the contractor steam clean the equipment before coming on site?**

If your site is relatively free of invasive species (e.g., reed canary grass or purple loosestrife) you want to ensure the equipment carries no unwanted invasive plant seeds into your wetland.

It is important that you communicate your ideas to your contractor so that you are working toward the same goals and carry the same mental picture of the project. Be open to learning from the contractor's experience. A knowledgeable wetland contractor may have construction and design suggestions that benefit the project and save money.

Make sure your contractor understands the conditions of your permits and has a basic familiarity with water and water law. Violations can result in unnecessary problems and even expensive fines.



## Pre-Construction



Once you have chosen your contractor, reviewed and agreed on your plan, timetable and permit conditions, the following points should be discussed (if applicable to your plan).

- ✓ Discuss what equipment will be used and check into the availability of pumps. Ask that equipment is well maintained to minimize leaking oil, etc., and steam cleaned before entering your wetland.
- ✓ Decide who will be responsible for contacting “Diggers Hotline” at least three days prior to excavation to locate and mark any underground utility lines or cables in the area.
- ✓ Agree on routes that the equipment will take to and within the site.
- ✓ If pumps are used, discuss where the water will be disposed. If pumping is necessary, it may need to be included in the Wisconsin DNR permit.
- ✓ Point out those areas you want to remain undisturbed, such as young trees, remnant wetland plant areas, prairie plantings, or landscape features. Staking or flagging these areas with surveyor ribbon beforehand will help the contractor avoid them.
- ✓ Point out and flag property boundaries.
- ✓ Indicate areas that can be used to deposit and grade excavated material if needed.
- ✓ Discuss how the project will be staged to avoid damaging completed portions and dealing with water backing up on the site.
- ✓ Review erosion control measures and discuss how the contractor will remove the devices when they are no longer needed.
- ✓ Indicate that you or another designated person will inspect the construction work daily.
- ✓ Agree on terms for payment. Do not pay the entire amount until you are satisfied with the job.

## General Construction Recommendations

**You should visit the site daily and talk regularly with the contractor. An experienced person must closely monitor all phases of construction daily.** On the first day, arrive before construction begins. Review the plan with the contractor again to make sure you are in agreement about how to begin. Visually inspect the equipment. Look for obvious fluid leaks or other problems that can contaminate your site. Ask what the progression of the construction will be and what the contractor expects to accomplish each day.

Be a part of the construction. There is always plenty to do, so ask the contractor if you can help. You might be able to make changes while construction is in progress that is impossible once the contractor is gone.





## CONSTRUCTION TERMS AND SEEDING EQUIPMENT

### Construction Terms

**Backhoe-excavator**—A large piece of equipment on steel tracks. An excavation bucket is mounted at the end of a hydraulic arm. Backhoes with tires instead of tracks are rarely used in wetland work.

**Bio-matting**—A biodegradable woven mat that comes in various lengths. It is rolled in place and then staked to help stabilize slopes.

*Biodegradable bio-matting helps control soil erosion and allows desired vegetation to become established.*



Jeff Nania

**Bucket**—This is the actual excavator at the end of the hydraulic arm of the backhoe. Buckets come in all shapes and sizes. Some have large teeth on the edge of the bucket, others are smooth. The teeth rip through tough material, but a smooth-edged bucket usually works much better for wetland work.

**Dos-R valve**—Water control device used to connect with drain tile lines to raise the water level in lateral lines while allowing the main line to drain. Used for situations when it is impossible to disable tile lines without affecting other areas.

**Dozer or bulldozer**—This tracked earth mover scrapes earth with a front-mounted, hydraulically controlled blade. This and the backhoe are the two most common pieces of equipment used on wetland projects.

**Dragline**—A dragline is a large machine that operates like a crane. It has a large boom that allows a “clamshell” to be cast far into the site to excavate soils. Draglines are generally not efficient for wetland work and increasingly less available.

**Low ground pressure (LGP)**—This refers to any kind of equipment with wider than normal tracks. Wide tracks distribute the weight of the machine over a larger area. This keeps the machine from sinking into soft or wet soil. Low ground pressure tracks are used most on backhoes and dozers. LGP equipment is preferred for wetland work.

**Mats**—Mats are 12-inch by 12-inch or larger, 20-foot-long timbers connected together with chain or cable. Used in very wet conditions, a machine will sit on the mat to prevent it from sinking. A backhoe will use two or more sets of mats at one time. Experienced wetland contractors often will have these mats on site just in case they are needed.



Jeff Nania

*Pump dewateres a wetland site under construction.*

**Pumps**—Pumps are usually self-contained units to which large hoses are attached. The pumps dewater sites during the construction process, keeping the work area as dry as possible. A contractor should have access to pumps.

**Scraper**—This is an excavator often used when spoil must be moved off site. This large machine with front and rear engines has an area in the middle for collecting earth.

**Silt fence**—Silt fence is tightly woven plastic strung between wooden stakes that comes in long rolls. Silt fence is often used across waterways to prevent downstream siltation. It is also used to surround disturbed soil areas in order to curb erosion.

**Spoil**—The soil that has been excavated and deposited in a pile on the soil surface.

**Transit/level and grade pole**—These two pieces are often used on wetland restoration sites. The transit/level is mounted on a tripod; you look through the transit at the grade pole, which is like a big ruler with numbers. Those numbers are used to determine ground elevation and contours.

### Seeding Equipment

**Brillion seeder**—The brillion has a box seeder mounted on the front that distributes grass seed in a random pattern, not in rows, with brushes inside the hopper. The seeder is mounted on a culti-packer that immediately presses seed into the soil. Seeds are planted at a shallow depth. Usually soil is well worked and disced before seeding.

**Disc**—An agricultural device pulled by a tractor and used to stir and level soil before planting.

**Hand-broadcast seed**—Seed may be mixed with damp sand, vermiculite or sawdust and tossed by hand on the site.

**No-till seed drill**—Special seeder that drops seed into a small trench and covers it. It is especially useful for upland prairie plantings, and may eliminate the need to disc soil before seeding.

**Seeder**—Seeders can be hand held or mounted onto a tractor or ATV. Seed may be mixed with damp sand, vermiculite or sawdust.



For example, it is very difficult to regrade muck soil at a later time; it has to be done to your satisfaction while the equipment and crew are present.

An experienced contractor will have a plan of how to deal with water on the site. As you begin to plug and fill ditches, break tile, or move soil, the water may quickly return to the site. This is exactly what you want to happen, but your contractor needs to work fast to keep ahead of the water. You are better off letting the water continue to drain from the site during construction, with the last step closing off the lowest point where water drains. The contractor may pump water while the construction proceeds. When filling ditches, the contractor should make sure the site can drain and prevent flooding of areas still under construction. If plans call for topsoil to be stockpiled for re-spreading after scraping the subsoil, make sure that the last step of re-spreading topsoil really happens. Commonly a contractor pulls out of the job before re-spreading the topsoil adequately, especially if the site is now under water. Not only are you left with an unnatural looking pile, but also this topsoil is what some plants need to thrive and often contains the seed bank needed to re-vegetate your site.

If a berm or ditch plug is included in your plans, be careful that the topsoil of organic soils and root masses are not used in the core or foundation of these structures. If topsoil is used in the core of a berm, decomposition of the plant materials over time can cause berm failure. The core of any feature containing water needs to be made up of compacted mineral soil.

Use adequate erosion control on all wetland work to ensure that sediment does not wash into local streams or lakes. All exposed surfaces need to be seeded quickly or utilize erosion matting to keep them from eroding. In general, prevent environmental damage to other resources while you construct the restoration site.

When the contractor completes the job and *before* equipment is removed, do a walk-through with the plan in hand. Make sure everything conforms to expectations. If any work remaining requires the contractor to come back, find out when, and make final payment only after everything is to your satisfaction.



Jeff Nemira

*Mats like these on a flatbed truck are used to keep equipment from sinking into wetland soils.*

## conclusion



Implementing your plan is an exciting phase of your project. If you have made sound decisions, you have given your wetland a great boost on the road back to ecological health. Pay great attention to detail at the time of construction and visit the site at least daily. You will find the time spent on site during this critical phase of the project rewarding.

