



# Wild Rice Seeding Guidelines (644)

## Biology Jobsheet #14

Natural Resources Conservation Service (NRCS) – Minnesota

12/04

This jobsheet is a guide to the restoration or establishment of wild rice beds for the purpose of Field Office Technical Guide (FOTG) Standards for Wetland Wildlife Habitat Management (644).

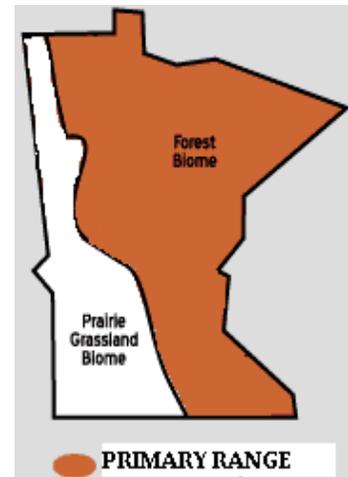
### Background:

Wild rice (*Zizania palustris*, or northern wild rice) Minnesota's state grain, is an annual aquatic grass with significant ecological value. It is best known for the nutritious seed it produces which is a favored food of many species of waterfowl. Seed production can be quite abundant, with an acre of wild rice producing over 500 pounds of seed.

Wild rice has other ecological values as well. It provides good cover and brood rearing habitat for waterfowl and other wetland birds. It is also fed upon by muskrats, deer and other herbivores. Wild rice beds can be important nursery areas for young fish and amphibians, and they attract rails, red-winged blackbirds and other species of birds in the fall. Wild rice beds can also help maintain wetland water quality by tying up nutrients, stabilizing loose soils, and forming a natural windbreak over shallow-water areas, preventing soil nutrients from being stirred into the water column. Decaying straw from the previous year's growth can increase invertebrates, an important food source for a variety of wetland wildlife including birds, small fish and amphibians.

Wild rice also has significant historical and cultural values. Its seed has long been a staple in the diet and traditions of Native Americans living within its range, including the Ojibwa (who refer to it as manoomin or "good berry"), the Menominee (who take their name from this plant) and the Dakota. It has also long been an economic commodity, traded with the early fur traders and voyageurs which came to rely upon the nutritious seed as well.

Although once a fairly common plant within its range, many historic wild rice beds have been lost to human-induced alterations to the landscape. The damming of lakes and rivers and the artificial control of water levels has likely led to the greatest losses, but pollution, heavy boat traffic, the introduction of exotic species, and other factors have all contributed to the decline. Many lakeshore residents and boaters consider wild rice to be a nuisance aquatic plant. Recent increases in beaver populations and their activities in blocking culverts and lake outlets are a significant management challenge because their dams can raise water levels beyond wild rice tolerances.



### Ecology and Life Cycle:

**Water:** Wild rice generally does best in slow moving water, with rivers, flowages and lakes with inlets and outlets being optimal examples. Intermittent and seasonal flow water bodies may sustain beds, but annual rice production may fluctuate more markedly on these sites. Water depth is critical. Wild rice grows in about 0.5-3 feet of water, with 1.5 feet being optimal. (Although rice will grow in deeper water, those plants often do not successfully produce seed.)

Clearer water is preferred, as darkly stained water may limit sunlight penetration and hinder early plant development. However, rice beds can be supported on moderately stained waters, particularly when water depths are limited. Wild rice does best in water that is neither too acidic nor alkaline with an optimum pH range of 6.0 - 8.0.

Within a particular year water level fluctuations should not be too great. Generally, water levels that are relatively stable or decline gradually during the growing season are preferred. However, it is equally important that water levels not be kept too stable over the long term (multiple years). That kind of stability will tend to favor perennial vegetation over an annual like wild rice.

**Soils:** Several inches or more of soft organic muck is ideal. However, wild rice appears to be somewhat tolerant of sandy soils. Although extremely flocculent (unconsolidated) bottoms may be unsuitable, moderately flocculent sites often give great results.

**Existing Vegetation:** Avoid sites with excessive amounts of well-established, perennial vegetation. Where water control exists, it may be possible to knock-back competing submergent vegetation with an over-winter drawdown every 4-6 years. Competing perennial emergent vegetation can be reduced with high water levels on approximately the same cycle. Manipulating water levels of most basins cannot be done without a permit. Be sure to check with the Minnesota Department of Natural Resources before considering water level changes.

**Boats:** Areas subject to high wave action from heavy watercraft activity may be unsuitable, unless local “no-wake” regulations can be established to protect the beds.



**Life Cycle:** Wild rice seed generally needs to spend several months under freezing or near freezing conditions in order for germination to occur. After spending the winter in the sediment, the seed begins to germinate soon after ice out, and by mid May a cluster of short, underwater leaves has begun to form. Subsequent leaves eventually reach up to the water's surface, and float upon it, in what is termed the “floating leaf stage”, by mid-June. This is often considered a critical growth stage, for the buoyant plants can be uprooted from soft sediments by high wind or waves. The plants can also drown at this stage if water levels suddenly increase, since the plants begin exchanging gasses with the air after the floating leaf stage is reached.

By late June, the aerial shoots have broken the water's surface, and the plant becomes an emergent. The emergent stems will eventually reach a height of 2-8 feet above the surface. Plants may have a single emergent stem, or multiple stems (tillers) may develop. Tilling tends to be more pronounced in shallow water, and when the plant density is low. Each stem will produce a flower head at its tip. The flowers begin to open in late July, with the female flowers at the top of a stem opening before the male flowers below them, to promote cross-pollination by the wind.

The seeds begin to reach maturity in late August and early September. Maturation is fairly variable. Riverbeds tend to mature earlier than lakebeds, shallow plants will ripen earlier than those in deeper water, and “main stems” will ripen before tillers. Seeds on a single stem also ripen gradually, with those at the top ripening first. Thus, the total period of seed maturation may last 2-3 weeks on a single bed. Mature seed drops from the stem, and generally enters the sediment fairly close to the mother plant.

Because wild rice is an annual plant, seed production varies from year to year, sometimes dramatically. A 4-year period is likely to have a boom year, a bust year, and a couple of middling years.

### **How to Proceed With Seeding:**

**Site Evaluation:** If the site to be seeded is public water an aquatic plant management permit is required from the Minnesota Department of Natural Resources. Check with the local area fisheries office for more information. A site may be legally considered public water even though the shoreline is privately owned and there is no public access. County maps of public water basins are available for viewing at DNR offices, most county auditor offices and the DNR website: [www.dnr.state.mn.us](http://www.dnr.state.mn.us).

If the site to be seeded has been determined to be private be sure to check with any other shoreline owners before proceeding with planting. Not everyone appreciates the value of wild rice.

**Site History:** Try to determine if wild rice was ever present and how many years have passed since a bed existed. Do not seed a site that has produced a crop within the past 5-8 years. A viable seed bank may still exist, but some other negative factor is affecting the rice. Try to determine and address the factor causing the decline, and give the remnant seed bank a chance to reestablish the bed before proceeding with a seeding effort.

Wetland restorations and created impoundments can provide excellent opportunities to establish wild rice. If the soils of a newly flooded site remain root bound, consider a mid to late summer complete drawdown to aerate the bottom soils and encourage decomposition of the dead roots. Re-flood the next spring to prepare for planting.

**Site Suitability:** Determine if the site has suitable depths, water clarity, flow, sediments (as described above), and that competing perennial vegetation is not too dense. Visit the site in late July or August to document any existing wild rice plants. If in doubt, seek assistance from a local natural resources agency.

### **Seed Sources**

There are three options for obtaining wild rice seed: harvest it yourself, buy it directly from a harvester, or obtain it from a wild plant nursery. There are advantages and disadvantages to each approach. Regardless of the method employed be sure to meet all permit requirements. Seed from local sources is preferred. Do not use seed originating more than 200 miles from the proposed planting site.

**Self-Harvesting:** Self-harvesting is the least expensive, allows you to select the source, and ensures its quality. Harvesting can increase your understanding of wild rice habitat and allow you to receive credit for your time and/or the value of the seed gathered. Gathering wild rice is not particularly difficult and some understanding of the technique can be obtained from the Minnesota Department of Natural Resources or the Great Lakes Indian Fish and Wildlife Commission. A harvesting license is nearly always required. Information on harvest regulations and licenses is contained in the Minnesota DNR's annual Hunting and Trapping Regulations Handbook.

**Purchasing:** Wild rice can be purchased directly from a harvester in your area during the harvest season. This provides a local seed source and assures the seed obtained will be fresh. Seed can also be purchased from a commercial outlet. This seed will generally be of good quality, but will likely have an unknown origin. Be sure to request information from the supplier about the source of the seed. DO NOT use seed from more than 200 miles from the planting site nor commercial varieties of seed that have been developed for the "paddy" wild rice industry. Contact the Minnesota Department of Natural Resources for suitable sources of seed.

### **When to plant:**

**Fall Seeding:** Fall seeding is recommended to allow the seed to over winter in the sediments. The easiest option is to plant the seed within a few days of getting it. If this is not possible, the seed must be stored in a way that does not allow it to dry out or to heat up. (For this reason, wild rice that has been "finished" for human consumption cannot be used for planting). One good way to do this is to place the seed in grain sacks and sink it in a lake or stream until it can be used. It can also be kept in large, water-filled tanks. However, with the latter method, the seeds may take on a rank smell. Frequent changes of water (roughly every other day) will help reduce this nuisance but is not necessary to maintain seed viability. Immediate seeding is often the least amount of work, but it may have the drawback that ducks or other animals may consume some seed during the remainder of the fall. For this reason some people store the rice as described above, and plant it later in the fall before ice up.

**Spring seeding:** Spring seeding is sometimes done, but it must be done immediately after ice-out to be successful. It is also possible to seed on the ice in late winter. The biggest plus to this approach is that it is easy to tell which areas have been seeded and how heavily; its drawbacks are that it is fairly labor intensive, and requires storing the seed for a long period of time.

### **Seeding Methods:**

Seeding can be done by simple hand broadcasting from a canoe or similar small boat. (It is not necessary to roll the seed into mud balls as some historical literature suggests). Seed at a rate of roughly 40-50 pounds per acre.

In the wild, the wild rice bed which grows in any particular year will be the product of at least 4-5 different years of seed production. It is generally beneficial to replicate this in seeding efforts by continuing to seed sites for several years in a row.

Although some seedings will show immediate response, it is best to begin each seeding effort with the expectation that it may take 3-4 years to determine if a site can be successfully established. No results the first year could mean poor seed, poor spring environmental conditions, or excessive depredation. The lack of first year response does not necessarily mean the site is unsuitable.

Because of its great attractiveness to various species of wildlife, small stands of wild rice may be difficult to sustain, especially if habitat conditions are less than optimal. Thus, seeding areas of less than an acre are not recommended.

Where large acreages of wild rice are the ultimate goal, it is generally best to begin with a test seeding of smaller areas of 2-3 acres, and monitoring those sites before expending the labor and expense associated with larger seedings.

### **Monitoring:**

It is very important to monitor the success of the seeding attempts. Make several visits to the site over the growing season to document how plant development is proceeding, and keep detailed notes. If plants initially grow well, but later wither and die, there may be a nutrient shortage; if plants grow well, but get nipped at the water line, excessive muskrat or goose browsing may be occurring; if no growth occurs, there may be a problem with seed viability, the site may be unsuitable, or its suitability may have been affected by a change in water level or some other factor. A good response may confirm the suitability of the site and suggest the seeding can be expanded, or that additional seeding may not be necessary. Good follow-up monitoring is critical to determining future actions.

### **Reasonable Accomplishment Expectations:**

As noted above, wild rice production on established beds varies significantly in abundance from year to year. This variability, which even includes occasional crop failures, are natural and do not require reseeded on established beds. If a well-established bed gradually weakens over several years, it may suggest that water levels are being held too high or too stable. If you have concerns, contact a natural resource biologist for assistance.

### **References:**

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- b. They have obtained all necessary permits and/or rights in advance of practice application, and will comply with all ordinances and laws pertaining to the application of this practice.
- c. No changes will be made in the installation of the job without prior concurrence of the NRCS.
- d. Maintenance of the installed work is necessary for proper performance during the life of the practice. The practice life is \_\_\_\_\_.

**I have reviewed all specifications and agree to install as specified:**

Landowner/operator name and title (type or print):		
Landowner/operator Signature:		Date:
Landowner/operator name and title (type or print):		
Landowner/operator Signature:		Date:

***NRCS Review Only***

**DESIGN INSTALLATION AND LAYOUT APPROVAL:**

Designed By:	Date:	Job Approval Authority (JAA):
Approved By:	Date:	Job Approval Authority (JAA):

**RECORD OF COMPLETION AND CHECK OUT CERTIFICATION:**

Treated Acres:	Date Completed by Client:	Date Certified:

**Certification Statement:**

I certify that implementation of this conservation practice is complete, meets criteria for the stated purpose(s), and meets the NRCS conservation practice standard and specifications.

NRCS Signature:	Date:	Job Approval Authority (JAA):