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# Wisconsin Biology Technical Note 4

## Wild Rice Seeding Guidelines

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This technical note is intended to be used as a guide to the restoration or establishment of wild rice beds for the purpose of Field Office Technical Guide (FOTG) Standards for Wildlife Wetland Habitat Management (644) and Restoration and Management of Declining Habitats (643). Refer to those standards for specific practice purposes and requirements.

### **Background:**

Wild rice (*Zizania palustris*, or northern wild rice, and *Zizania aquatica*, or southern wild rice) is an aquatic plant with significant ecological value. It is best known for the nutritious seed it produces which is a favored food of many species of ducks, geese and swans. 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 ducks, and is fed upon by muskrats, deer and other herbivores. 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. 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.

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), 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, who 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 various 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. These losses accentuate the need for rice restoration efforts.

### **Ecology and Life Cycle:**

Wild rice is an annual aquatic grass that goes through submerged, floating-leaf, and emergent stages in the course of its development.

### *Habitat Requirements*

*Water:* Rice does best in the presence of flowing water, with rivers and flowages being optimal examples, or lakes that have inlets and outlets. Intermittent and seasonal flow waterbodies may sustain beds, but annual rice production may fluctuate more markedly on these sites.

Water depth is critical. 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. Optimum pH range is 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 (or more) inches of soft organic muck is ideal. However, rice appears to be fairly tolerant on this variable, and beds do grow on a wide variety of bottom types, including sandy and rocky types. 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 vegetation with over-winter drawdowns every 4-6 years.

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 in early spring, and by late 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”, which is often obtained 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 are breaking 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 tillers may develop. Tillering 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 males flowers below them, to promote cross-pollination. Although bees often gather pollen from the male flowers, they do not visit the female flowers, and actual pollination is accomplished by the wind.

The seeds begin to reach maturity in late August or early September. Maturation is fairly variable. River beds tend to mature earlier than lake beds, 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 very dramatically. A 4-year period is likely to have a boom year, a bust year, and a couple of middling years. Generally, the more water that flows through a site, the more consistent the production.

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

### *Site Evaluation*

**Site Ownership:** If the site to be seeded is privately owned, proceed with the seeding effort. However, if the site includes public waters, such as the bed of a lake, contact adjacent riparian land owners or the lake association (if one exists) to gain their support. Also, contact the local office of the Wisconsin Department of Natural Resources or any other land management agency that might be involved.

**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.

**Site Suitability:** Make a rough field evaluation of the suitability of the proposed site. 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.

### *Seeding*

**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.

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. However, there are regulations which must be followed, and some understanding of the technique which should be obtained. Contact the Wisconsin Department of Natural Resources or the Great Lakes Indian Fish and Wildlife Commission for harvesting information.

Rice can be purchased directly from a harvester in your area during the harvest season. The “boat landing” cost of wild rice in Wisconsin in 2003 was about \$2.00 per pound. This provides a local seed source and assures the seed obtained will be fresh.

The most expensive, but easiest approach, is to buy seed from a commercial outlet. This seed will generally be of good quality, but will likely have an unknown origin. DO NOT use commercial varieties of seed that have been developed for the “paddy” wild rice industry.

*Zizania palustris or Zizania Aquatica?* Both northern wild rice (*Zizania palustris*) and southern wild rice (*Zizania aquatica*) are native to Wisconsin. The northern variety grows across the state (but is more common in the north), while the southern one is generally absent from the northwestern part of the state and is most common in the south. Both have great value to wildlife, although the northern variety tends to be shorter in height, and has larger seeds that are more favored for human harvesting (and tends to be the only variety which is available through wild plant nurseries).

In the northern half of the state, northern wild rice should be planted. In the southern part of the state, either variety could be used. In all cases, it is preferable to obtain seed from a relatively local source when possible.

*When to plant:* Fall planting is recommended to allow the seed to overwinter 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 and require frequent changes of water (roughly every other day).

Immediate seeding is often the least amount of work, but it may have the drawback that some seed may be consumed by ducks or other animals during the remainder of the fall. For this reason some people store the rice as described above, and plant it later in the fall when most of the duck migration has passed.

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 and Rates:* 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.

*Multiple Years Seeding:* 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, etc., and the lack of first year response does not mean the site is unsuitable.

*Seeding Area:* 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 vary significantly in abundance from year to year. This variability, which even includes occasional crop failures, are natural and do not require reseeding on established beds. If a well established bed gradually weakens over several years, it may suggest that water levels are being held too stable. If you have concerns, contact a natural resource biologist for assistance.

#### **References:**

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