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# Wisconsin Biology Technical Note 3

## Fish Spawning Reef

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### Introduction

**Definition of Fish Spawning Reef:**

Placement of rock on the bed of a water body to create or enhance natural reproduction of fish. These reefs are made up of rock in a wide range of sizes and placed on the bed of a lake or stream, generally in 2 to 5 feet of water.

**Purpose:**

Provide suitable spawning substrate for enhancement of natural recruitment of targeted fish species.

**Assessment:**

A qualified fisheries biologist shall determine that the water body in which the spawning reef will be constructed is capable of supporting the targeted fish species. Documentation of past or present use of the water body by the targeted fish species should be provided along with evidence that indicates the lack of suitable spawning areas are a limiting factor for this fish population in the water body.

In no case shall a spawning reef be developed where there is no history of the target fish species being present in the water body or where the lack of spawning habitat is not clearly shown to be a limiting factor in fish population.

Wisconsin Field Office Technical Guide (FOTG) Standard 580, Streambank and Shoreline Protection, provides specific criteria for working in aquatic environments. Standard 580 also lists criteria for operation and maintenance of the practice (section VIII). Local zoning ordinances or state and federal laws relating to placement of materials in water bodies may provide additional requirements and guidance. These may include permit requirements, environmental assessments, management and maintenance plans, and restrictions to protect public safety and commerce.

**Required Documentation:**

All plans for fish spawning reefs will contain the following minimum information:

**A. Support Documentation.**

1. A narrative description of the project describing species of fish to be benefited.
2. Location and types of plant populations currently present in the vicinity of the planned reefs.
3. A contour map of the part of the water body in which the reefs will be placed.

4. Location of any known threatened or endangered species or species of special concern, both plant and animal, in the vicinity of the planned reefs.
5. Type of bottom materials on which the reef will be placed, i.e., sand, gravel, or organic materials.
6. Description of public safety concerns and a plan to address these concerns, if present.
7. Clear indication of who will be supervising installation and who will obtain the necessary permits.
8. Site specific environmental evaluation of the project.
9. A plan for monitoring the site for maintenance needs and for determination of success.
10. A narrative assessment from a qualified fisheries biologist containing the information described in "Assessment."

#### B. Construction Plan Documentation.

1. A map clearly showing size, shape, and location of reefs.
2. Cross sectional drawing of the planned reef showing planned thickness, slopes, and depth of water under normal conditions at all reef locations.
3. Average size, gradation, and type of rock to be used.
4. Global Positioning System or other reproducible coordinate system sufficient to layout and define the extent of the reef.
5. Access to the site, if known, or a statement that the contractor will determine and obtain access to the site.

#### **Selection of Materials:**

1. Man-made materials such as concrete, steel, or plastic are not to be used.
2. Natural materials are the only acceptable medium. Clean rounded rock is the preferred material. Other rock materials may be used where rounded rock is not available.
3. Materials must be long lasting. Igneous rock is preferred over sedimentary rock.
4. Rock size shall generally be a  $D_{50}$  of 2 to 6 inches and shall include no fines. Larger rock provides larger interstices that become microhabitats to enhance benthic productivity and so provide a substantial forage base for young fish

#### **Determination of Size and Location:**

1. The relative area of the reef, or reefs, will be proportional to the size of the water body and the relative shortage or abundance of suitable spawning habitat present as determined by the fisheries biologist. Needs of the fish species to be benefited and practical limitations to placement of materials should also be considered.
2. The reef shall be placed so it will not destroy other valuable existing fish or wildlife habitat. Weed lines, natural bottom contours, valuable plant growth such as wild rice or wild celery shall be considered.
3. Rock shall be placed to achieve a stable angle of repose under water, generally 3:1 or flatter.
4. Rock is normally placed on the ice parallel to the shoreline in the shape and size determined for the reef location. Thickness is generally not more than 24 inches.
5. Successful reefs generally have good exposure to westerly or southerly winds.
6. Exposure to wind and gaps between reefs will help to ensure that they are not buried by sediment. Depth of rock placement in the water body should be related to the expected wave height to assure water movement on the reef. Water depth measured from the top of the rock to the normal water surface should generally be no more than 3 feet. The reef should be deep enough to prevent wave energy from dispersing the rock, but shallow enough to allow gentle

water movement over the reef from wave action. This gentle movement will help prevent silting of the reef and provide oxygenated water to the egg masses and developing fry.

7. The shape of the reef should be designed to maximize underwater edges exposed to the wave action. Generally the shape should be long and linear rather than short and wide.
8. The materials upon which the reef is placed shall be capable of supporting the reef. Do not construct reefs in areas with soft muck bottoms or an excess of fines.
9. Reefs shall be located in areas that have a previous history of fish spawning or are in the path of a known spawning run. Randomly placed reefs tend to benefit non-target species such as the common sucker.

### **Considerations:**

1. Consider public safety and navigation. If it is expected that there will be navigation in the area of the reef, additional laws and permits may apply.
2. If erosion or pollution will potentially impact the water body in which the reef will be placed, these concerns should be addressed prior to construction.
3. Consider the location of the reef in relation to other activities on the water body such as shoreline development, water passages, wildlife use, or any other natural or human activity that might affect the success of the reef.
4. Consider potential of the reef to be impacted by natural or human-induced actions. Consider wave action, off site impacts from erosion or pollution, and the potential for ice damage.

### **Site protection and maintenance:**

1. All areas disturbed during construction will be seeded in accordance with Wisconsin Standard 342, Critical Area Planting.
2. Sites should be regularly monitored. If sites are being impacted by sedimentation, pollution, or noxious or invasive plants, necessary maintenance activities shall be performed. An operation and maintenance plan is required.

### **Resources:**

1. All Spawning Reefs will be designed by, or with the assistance of, a qualified fisheries biologist. Qualified persons may be available from state, federal, tribal, or local agencies or from non governmental organizations and private consultants.
2. Science, technology, and research relating to development of artificial spawning reefs are rapidly developing and evolving. Efforts should be made to use the most current technology available. Planners should reference scientific papers, graduate papers, and electronic references that were used in developing the plans.
3. Wisconsin FOTG Standards 580, Streambank and Shoreline Protection; 342 Critical Area Planting, 644 Wetland Wildlife Habitat Management.