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Environmental Effects of Dredging Technical Notes

THE VALUE OF WING DAMS FOR FRESHWATER MUSSELS

PURPOSE: This note provides information on the value of wing dams, which reduce dredging requirements in large rivers, for freshwater mussels.

BACKGROUND: Wing dams are longitudinal rock-rubble structures placed in waterways to develop and stabilize channels. Wing dams constrict low flows, which decreases maintenance dredging requirements (Shields 1983). These structures are usually oriented obliquely or at 90 deg to the current. Sediment deposition usually occurs between wing dams where current velocity is reduced relative to that in the unprotected main channel. Wing dams create quiescent areas that are similar to naturally occurring lentic habitats during normal and low flow (Beckett et al. 1983). In addition, wing dams themselves are a coarse-grained substrate used by aquatic insects and fishes (Conner, Pennington, and Bosley 1983; Pennington, Baker, and Bond 1983; and Shields 1983).

At Winter's Landing in pool 7 of the upper Mississippi River, wing dams were placed to direct flow toward the Wisconsin shoreline to reduce the need for maintenance dredging. The US Army Engineer District, St. Paul is considering modifying these wing dams to further reduce dredging requirements. Because of these plans, the value of these wing dams had to be assessed for mussels, and a determination had to be made concerning whether the federally listed endangered mussel *Lampsilis higginsi* inhabited the area.

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Background

Study area

The study area is between river mile (RM) 707.8 and 709.4 in pool 7 of the upper Mississippi River, about 2 km north of Dakota, MN (Figure 1). Pool 7 extends from Lock and Dam 7 (RM 702.5) at Dresbach, MN, to Lock and Dam 6 (RM 714.3), near Trempealeau, WI. Sample sites (Figure 1) were located

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on wing dams (sites 1, 2); between wing dams within 200 m of the Wisconsin shore or protected by wing dams (3-18); farther offshore and unprotected by wing dams (19-27); and 50 to 600 m from the Wisconsin shore and unprotected by wing dams (28-32).

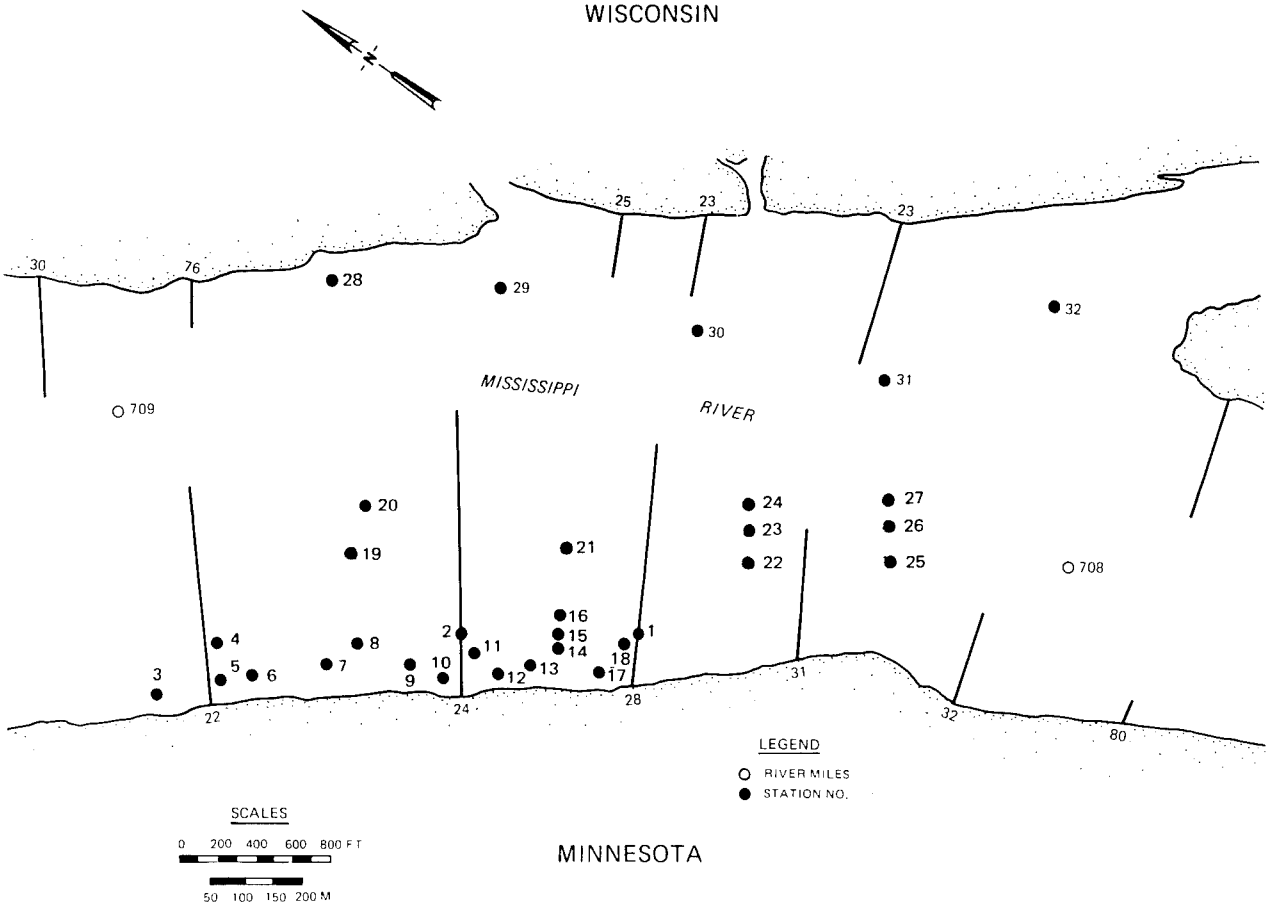

Figure 1. Sample sites located on wing dams

Methods

Mussels were collected on May 19-21, 1987, by a four-man diving crew equipped with surface air supply. At each of 30 sites, a single diver spent 20 min collecting live mussels. Two sites on wing dams were searched for 40 min because of difficulty in maneuvering. Collecting was done by feel since visibility in the water was poor. This work was conducted under the authority of Endangered Species Permit No. PRT2-697830 of the US Army Engineer District, St. Paul.

Major Findings

A total of 2,087 live mussels, representing 23 species, was collected during the survey (Miller 1988). Each of the 32 sites supported from 3 to 141 mussels representing 2 to 15 species. In addition to common mussels, three rare species (*Actinonaias ligamentina*, *Plethobasus cyphyus*, and *Strophitus undulatus*), were collected. These had not been reported since 1930 (van der Schalie and van der Schalie 1950). Two specimens of the endangered *Lampsilis higginsi*, last collected in 1966 (Finke 1966), were also found. These uncommon mussels were collected within 200 m of the Minnesota shoreline at sites protected by wing dams.

The average total number of mussels collected per minute and the total species richness for sites were, respectively, 2.38 and 11 on wing dams and 4.47 and 23 in areas protected by wing dams and within 200 m of the Minnesota shore. Low values were found for sites unprotected and offshore (1.95 and 10) and for sites unprotected and 50 to 600 m from the Wisconsin shore (1.16 and 7). These data illustrate that the wing dams enabled development of a dense and rich mussel assemblage. Wing dams may also encourage mussels because they attract fishes that are necessary hosts for most species (Fuller 1974).

The US Army Engineer District, St. Paul proposes to shorten the wing dams on the Minnesota side and to lengthen those on the Wisconsin shore. In addition, five new wing dams will be constructed, and the Minnesota shore will be stabilized with riprap. This will direct the river toward the Minnesota side, its natural tendency, and reduce requirements for maintenance dredging (US Army Engineer District, St. Paul 1987). In addition, District personnel are considering placing dredged material (clean sands and silts) between two of the wing dams. This will quickly stabilize the substrate and provide colonization sites for mussels. In addition, this will be a beneficial use of dredged material, which otherwise might be wasted.

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