US Army Corps
of Engineers
Waterways Experiment
Station

# Zebra Mussel Research Technical Notes



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## Evaluating the Susceptibility of Structures to Zebra Mussel Infestation

**Background**

Early in 1992, the U.S Army Engineer District, Nashville, evaluated major projects for susceptibility to zebra mussel infestation. Projects under consideration included locks, dams, and power facilities in the Cumberland and Tennessee River systems. This evaluation was conducted so that operations and maintenance personnel could make efficient use of time and funding when preparing for zebra mussels.

**Purpose**

The purpose of this technical note is to describe the methods used by Nashville District personnel to evaluate the susceptibility of projects to infestation by zebra mussels.

**Additional information**

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**Determining susceptibility to zebra mussel infestation**

The tolerance of zebra mussels to selected water quality parameters was determined from information provided by the Zebra Mussel Clearinghouse of New York Sea Grant. Using these data, a matrix that predicted the colonization potential of zebra mussels (from high to very low) versus ranges in selected water quality parameters (such as salinity, dissolved calcium, and water velocity) was prepared (Table 1).

Using the information in this matrix, the likelihood of zebra mussel infestation at major projects on the Cumberland and Tennessee River systems was analyzed. For example, in the Cumberland River, it was determined that Barkley Lake would be highly susceptible to infestation because it did not stratify, and all parameters (including calcium and dissolved oxygen) were appropriate. Conversely, Laurel Lake, a tributary to the Cumberland River, was judged to be least susceptible, mainly because of reduced dissolved calcium.

As zebra mussels spread throughout the inland waterway system, Nashville District personnel will be able to measure susceptibility of projects by direct inspection. With new information, the predictive matrix can be revised. Regardless, the information provided by the matrix, and the ability to use these data to as-

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sist with planning, will enable District personnel to concentrate their time and resources on projects that are most likely to be affected by zebra mussels.

**Table 1**
**Comparison of Zebra Mussel Colonization Potential with Environmental Tolerances**

| Variable | Colonization Potential | | | |
|---|---|---|---|---|
| | **High** | **Moderate** | **Low** | **Very Low** |
| Salinity, ppt | 0-1 | 1-4 | 4-10 | 10-35 |
| Calcium, ppt | 25-125 | 20-25 | 12-20 | <12 |
| pH | 7.4-8.5 | 7.0-7.4<br>8.5-9.0 | 6.5-7.0 | <6.5<br>>9.0 |
| Water temperature, °C | 17-25 | 25-27 | 15-17 | <15<br>>27 |
| Turbidity, cm (Secchi disk) | 40-200 | 20-30 | 10-20<br>200-250 | <10<br>>250 |
| Dissolved oxygen, ppm | 8-10 | 6-8 | 4-6 | <4 |
| Water velocity, ft/sec | 1.6-2.3 | 0.3-1.6<br>2.3-3.3 | 3.3-6.6 | >6.6 |