

EXECUTIVE SUMMARY

The Army Corps of Engineers, New England District (NED) is conducting a multi-year feasibility study to identify restoration opportunities in the Blackstone River Basin in Massachusetts. The Blackstone River has historically been impacted by a wide variety of industrial and non-point sources (USACE, 1994). As part of this multi-faceted program, Battelle was contracted to conduct an Ecological Risk Assessment (ERA) of two impoundments along the Blackstone River, Fisherville Pond (Figure 1-1) and Singing Pond (Figure 1-3). Previous investigations have indicated that sediments from these areas contain elevated levels of some chemicals (USACE, 1997).

The original objective of this ERA was to evaluate the potential risks of sediment-associated contaminants to aquatic and terrestrial communities found at both Fisherville and Singing Pond. At the time the investigation was initiated in 1999, Fisherville Pond provided 69 acres of shallow open water habitat and about 21 acres of emergent, wet meadow habitat. However, in 2000, a blockage in the spillway of the Fisherville Dam failed, resulting in a substantial decrease in open water habitat and exposing mudflats that quickly became vegetated. As a result, under current conditions, both terrestrial and aquatic receptors may be exposed to the sediment-bound contaminants. As a result, Battelle has been contracted by NED to address the following questions:

- Under ponded conditions (i.e., restoring the impoundment at Fisherville Pond) are there areas within Fisherville Pond or Singing Pond that require management action (e.g., dredging) to reduce risks to wildlife and aquatic species?
- What is the relative magnitude of risks at Fisherville Pond under full pool versus reduced pool conditions?

To address these questions, a two-pronged approach was developed. The first focused on determining the potential risk to aquatic and piscivorous wildlife species among designated areas of Fisherville Pond and Singing Pond. Under this approach, it was assumed that the Fisherville Pond impoundment would be restored to its 1999 condition. A qualitative weight of evidence approach was used, deriving a measure of potential risk (e.g., high, medium, low) for specific areas including: Fisherville Pond-North Pool, Fisherville Pond-Central Pool, Fisherville Pond-South Pool, Singing Pond-Main Channel, Singing Pond-Marsh, and the designated reference area, Lake Wildwood (Figure 1-4). The second evaluation focused on the relative risks to wildlife (i.e., piscivorous or insectivorous/omnivorous) species from exposures with or without the impoundment at Fisherville Pond.

Based on the objectives of this evaluation (i.e., to evaluate potential risks to the ecological community) the following assessment endpoints were identified:

- Health of the benthic invertebrate community;
- Health of the fish community;
- Sustainability of upper trophic level receptors.

A weight of evidence approach was used with multiple lines of evidence (i.e., measurement endpoints) for each assessment endpoint. As outlined in the associated work plans (Battelle, 1999a,b, 2001), data considered for this evaluation included: 1) sediment chemistry; 2) porewater and surface water chemistry; 3) fish tissue chemistry; 4) fish community, 5) sediment toxicity; 6) benthic community analysis; and, 7) dose assessment for wildlife. In addition, the results of an associated Toxicity Identification Evaluation (TIE) were also considered (SAIC, 2000). These data were used to characterize potential risk to ecological resources in Fisherville Pond, Singing Pond, and Lake Wildwood.

In general, risks at Fisherville Pond-North Pool and Lake Wildwood are low. Sediment concentrations in the North Pool were relatively low, probably as a result of dredging that occurred there in 1982. In addition, the results of the bulk sediment toxicity bioassays indicated that little or minimal toxicity was associated with sediments collected from this area. Similar results were obtained for Lake Wildwood. COPC concentrations were generally very low with only one chemical (4,4'-DDE) detected at elevated concentrations. Limited toxicity was observed in the bulk sediment toxicity tests as well. All measurement endpoints for these areas were scored as low with the exception of the benthic community analysis and the metals mixtures.

Fisherville Pond-Central Pool and Singing Pond-Main Channel were both scored as medium with six of the 10 lines of evidence ranked as medium. In general, sediment concentrations throughout these areas were elevated, however, toxicity observed in the bioassays was relatively moderate. Estimated risks to wildlife species were also moderate. In Singing Pond-Marsh Area, all lines of evidence evaluated except the benthic community analysis and the metals mixtures were scored as high, therefore, this area was ranked as high. Fisherville Pond-South Pool was also scored as high, with five of the 10 lines of evidence scored as high. Station FP4, which indicated acute toxicity, is located in this area, and overall the toxicity measurement endpoint was ranked as high. The evaluation of risks to upper trophic level species also indicated high risks in this area.

Under the second assessment (i.e., relative risks from full pool versus reduced pool conditions within Fisherville Pond) it was determined that risks to piscivorous species and aquatic waterfowl were generally similar under both scenarios although slightly higher under full pool conditions. However, the reduction in risk under the reduced pool scenario was also associated with a dramatic decrease in available habitat. In contrast, risks to the terrestrial songbird were greatly increased under the reduced pool conditions.

In summary, the results indicate that, under full pool conditions, potential risks throughout much of Fisherville Pond and Singing Pond are relatively low, scoring as low or medium for most lines of evidence. The exceptions are Fisherville Pond-South Pool and Singing Pond-Marsh Area. Both of these areas were scored as having high potential risk to the receptors evaluated and may be associated with acute toxicity to benthic invertebrates. Based on this evaluation it is recommended that these two areas be further evaluated for possible remedial action.

Regarding the relative risks associated with the presence of the impoundment, the results indicate that overall risks to the wildlife species evaluated are likely to be lower under the full pool

conditions. Although risks to the mallard and river otter decreased slightly under the reduced pool conditions, the associated reduction in available habitat is likely to be detrimental, offsetting the potential benefit. In contrast, the available habitat increased substantially for the robin under the reduced pool conditions, magnifying the increase in potential risks associated with scenario. Based on this evaluation, it appears that restoring the former impoundment at Fisherville Pond would reduce potential risks to wildlife species.