

**Shellfish and other Invertebrates**—Shellfish were once widely distributed in the Herring River estuary. As a result of diking, which reduced salinity and pH, shellfish species are now found only a short distance upstream of the dike or are completely absent from this area. As demonstrated during the 1960s and early 1970s when poorly functioning tide gates allowed modest tidal exchange into the river, restoring tidal flows and improving water quality would increase habitat for shellfish and other invertebrates.

### 1.10.6 FEDERAL AND STATE-LISTED RARE, THREATENED, AND ENDANGERED SPECIES

**Federally listed Threatened and Endangered Species**—The Endangered Species Act of 1973 provides legal protection for federally listed endangered and threatened species, as well as those species proposed for listing under the Act. No federally listed threatened or endangered species have been documented within the Herring River project area. However, a search of the USFWS database identified the federally threatened subspecies of the red knot (*Calidris canutus rufa*) as potentially using tidal wetland habitats for foraging and the threatened northern long-eared bat (*Myotis septentrionalis*) as potentially using tidal wetlands for foraging and adjacent forested uplands as summer roosting habitat within the project area.

**State-listed Rare, Threatened, and Endangered Species**—Restoration of the Herring River estuary could impact several state-listed species and their habitats in the estuary, although not all impacts would be adverse. For marine or salt-tolerant species, such as diamondback terrapin (*Malaclemys terrapin*) and salt reedgrass (*Spartina cynosuroides*), tidal restoration would likely restore additional habitat. Changes in vegetation types could cause populations of eastern box turtle (*Terrapene c. carolina*) and water-willow stem borer (*Papaipema sulphurata*), species that rely on freshwater and upland habitats, to shift their range and move to adjacent habitat. Available nesting habitat for northern harrier (*Circus cyaneus*), primarily cat-tail dominated wetlands, could be affected by restored tidal exchange, but would likely remain unchanged. Foraging habitat for harriers would be improved with restored salt marsh. Four-toed salamander (*Hemidactylium scutatum*) and spotted turtle (*Clemmys guttata*), both found in the Herring River flood plain, were de-listed in 2008 and 2006 respectively. Several listed freshwater marsh bird species that may occur in the flood plain, including American bittern (*Botaurus lentiginosus*) and several rail species (*Rallus* spp.), could also be affected.

### 1.10.7 TERRESTRIAL WILDLIFE

**Birds**—Species common to shrub thickets and freshwater habitat likely increased in the Herring River flood plain as conditions changed due to the tidal restriction. These include red-winged blackbird, song sparrow, prairie warbler, common yellowthroat, eastern towhee, and grey catbird. Many of these species are abundant nesters elsewhere on Cape Cod and southeastern Massachusetts (Veit and Peterson 1993). Tidal restoration would eventually alter habitat conditions for some of these species and may cause them to shift to appropriate habitats upstream in the Herring River system.

Several high priority tidal creek and salt marsh-dependent species such as salt marsh sharp-tailed sparrow (*Ammodramus caudacutus*), willet (*Tringa semipalmata*), American black duck (*Anas rubripes*) (especially in winter), common and roseate tern (*Sterna hirundo* and *dougallii*), and several species of shorebirds and wading birds (USFWS 2006) are expected to benefit from restoration of nesting (*Spartina* dominated habitat) and/or foraging opportunities (primarily estuarine fish). Other species, such as osprey (*Pandion haliaetus*), belted kingfisher (*Megaceryle alcyon*), and marsh wren (*Cistothorus palustris*) likely, will benefit from the restoration of foraging habitat.