7.0 Natural Resources

This chapter provides background information on the natural resources associated with the Fernald site and summarizes the activities in 2005 relating to these resources. Included in this chapter is a discussion of the following:

- Threatened and endangered species
- Impacted habitat areas
- Ecological restoration activities
- Cultural resources.

Much of the 1,050 acres (425 hectares) of the Fernald site property is undeveloped land that provides habitat for a variety of animals and plants. Wetlands, deciduous and riparian (stream side) woodlands, old fields, grasslands, and aquatic habitats are among the Fernald site's natural resources. Some of these areas provide habitat for state and federal endangered species. Cultural resources, such as prehistoric archaeological sites, can also be found at the Fernald site. Monitoring of these natural and cultural resources is addressed in the Natural Resource Monitoring Plan, which is included in the IEMP. This document presents an approach for monitoring and reporting the status of several priority natural resources in order to remain in compliance with the pertinent regulations and agreements.

7.1 Threatened and Endangered Species

Sloan's Crayfish - The state-listed threatened Sloan's crayfish (*Orconectes sloanii*) is found in southwest Ohio and southeast Indiana. It prefers streams with constant (though not necessarily fast) current flowing over rocky bottoms. A large, well-established population of Sloan's crayfish is found at the Fernald site in the northern reaches of Paddys Run.

Indiana Brown Bat - The federally listed endangered Indiana brown bat (*Myotis sodalis*) forms colonies in hollow trees and under loose tree bark along riparian (stream side) areas during the summer. Excellent habitat for the Indiana brown bat has been identified at the Fernald site along the wooded banks of the northern reaches of Paddys Run. The habitat provides an extensive mature canopy of older trees and water throughout the year. One Indiana brown bat was captured and released on property in August of 1999.

Running Buffalo Clover - The federally listed endangered running buffalo clover (*Trifolium stoloniferum*) is a member of the clover family whose flower resembles that of the common white clover. Its leaves, however, differ from white clover in that they are heart-shaped and a lighter shade of green. Running buffalo clover has not been identified at the Fernald site; however, because running buffalo clover is found nearby in the Miami Whitewater Forest, the potential exists for this species to become established at the site. The running buffalo clover prefers habitat with well-drained soil, filtered sunlight, limited competition from other plants, and periodic disturbances. Suitable habitat areas include partially shaded grazed areas along Paddys Run and the storm sewer outfall ditch.

Spring Coral Root - The state-listed threatened spring coral root (*Corallorhiza wisteriana*) is a white and red orchid that blooms in April and May, and grows in partially shaded areas of forested wetlands and wooded ravines. This plant has not been identified at the Fernald site; however, suitable habitat exists in portions of the northern woodlot.

The Endangered Species Act requires the protection of any federally listed threatened or endangered species, as well as any habitat critical for the species' existence. Several Ohio laws mandate the protection of state-listed endangered species as well. Since 1993 a number of surveys have been conducted to determine the presence of any threatened or endangered species at the Fernald site. As a result of these surveys, the federally endangered Indiana brown bat and the state-threatened Sloan's crayfish have been found at the Fernald site. In addition, suitable habitat exists at the Fernald site for the federally endangered running buffalo clover and the state-threatened spring coral root. Neither of these species has been found on the property, but their habitat ranges encompass the Fernald site. Figure 7-1 shows the habitats and potential habitats of these species. Based on provisions set forth in the IEMP, any threatened or endangered species habitat will be surveyed prior to any remediation or restoration activities. If threatened or endangered species are present, appropriate avoidance or mitigation efforts will be undertaken. No surveys were conducted during 2005.

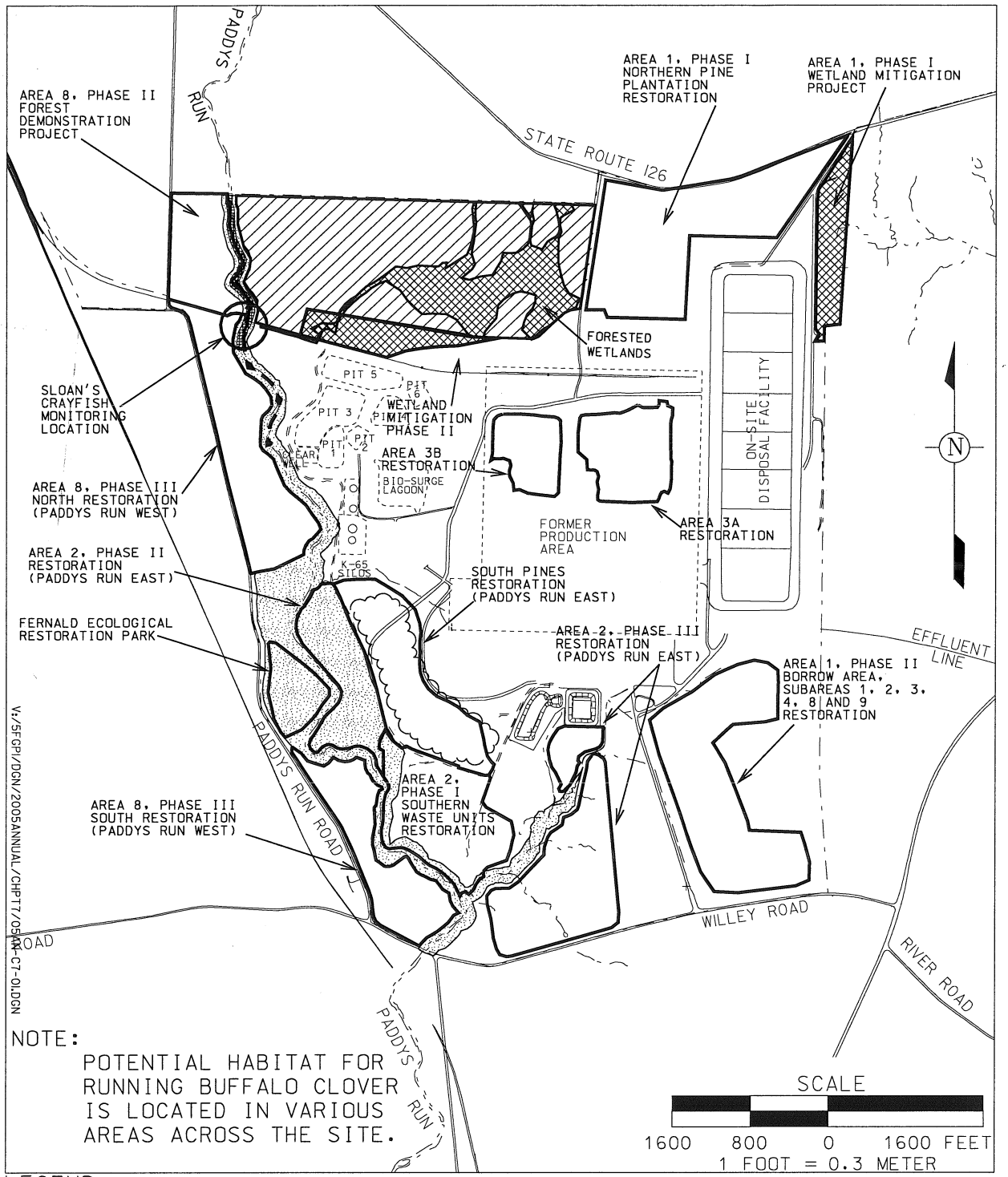

Figure 7-1. Priority Natural Resource Areas

7.1.1 Sloan's Crayfish Monitoring and Provisions for Protection

A Sloan's crayfish survey was conducted in August 2001 in order to determine if there were any impacts following debris removal near Paddys Run in Area 1 (Phase III). The survey results from the 2001 sampling effort demonstrated that the Paddys Run Sloan's crayfish population was not impacted by the debris removal operation. A large number of individuals were observed both downstream and upstream of the project area. Researchers did note a general decline in the ratio between Sloan's crayfish and *Orconectes rusticus*, which is a larger, more aggressive crayfish species that often competes with the Sloan's crayfish. Similar trends are observed statewide and are attributed to the aggressive nature of *Orconectes rusticus*.

The IEMP originally required that visual field inspections of sediment loading be conducted within one day of a "significant rain event," which is considered to be 0.5 inch (1.3 cm) or more of rain in one 24-hour period. The Sloan's crayfish monitoring program was suspended in 2002 because construction activities in the area decreased and episodes of increased sediment loading were rare. However, the program was resumed briefly in February 2003 due to railyard expansion activities and again in November 2003 when grading activities for the Wetland Mitigation Project (Phase II) commenced. Turbidity monitoring continued until June 2004, when the Wetland Mitigation Project (Phase II) was completed. Turbidity monitoring was not required in 2005.

7.2 Impacted Habitat

DOE and the Natural Resource Trustees tentatively agreed that it would not be necessary to quantitatively assess habitat impacted through remediation because DOE will be conducting natural resource restoration on approximately 900 acres (364 hectares) of the Fernald site. A summary of the year's habitat impacts is presented here.

The Southern Pine Plantation was partially cleared in February 2005 to support future restoration activities as planned in the Natural Resource Restoration Plan (DOE 2002c). Approximately six acres (2.4 hectares) of diseased Austrian pines (*Pinus nigra*) and some white pines (*Pinus strobes*) were cleared to make land available for the planting of native vegetation. Clearing was completed in the winter to minimize the impacts to wildlife using the area. Restoration activities were initiated in March 2005 including the planting of native trees, creation of vernal pools, and seeding.

Tree clearing was required in approximately 1.5 acres (0.6 hectares) of the storm sewer outfall ditch to allow for the removal of contaminated soil. This area impacted was within the footprint of planned impacts calculated by the Natural Resource Trustees in developing the Natural Resource Restoration Plan for the Fernald site. Impact occurred in approximately three acres (1.2 hectares) of wetland and upland area located immediately west of Waste Pit 3. The disturbance of this area was required as part of the remediation of the waste pit area. The wetland area impacted was identified in the Feasibility Study Report for Operable Unit 5 and Natural Resource Restoration Plan, as wetland acreage that would be impacted during site remediation. Restoration of the waste pit area will restore and expand the wetland in the area west of the former Waste Pit 3.

7.3 Ecological Restoration Activities

For 2005, ecological restoration was completed in the Paddys Run corridor (Paddys Run East and Paddys Run West), the borrow area (Area 1 [Phase II], Subareas 3, 4, and 8), and the former production area (Areas 3A and 3B). These projects are identified on Figure 7-1. Figure 7-1 also shows the location for previous restoration projects implemented at the Fernald site.

Restoration of the Paddys Run corridor included the conversion of existing leased pastures to the early stages of a native prairie, expanding the wooded corridor along Paddys Run in select locations, and the enhancement of existing woodlots through the removal of invasive vegetation. The Paddys Run East restoration project covered approximately 118 acres (47.8 hectares) and the Paddys Run West restoration project covered approximately 60 acres (24 hectares). Restoration work along the Paddys Run corridor was completed in the fall of 2005.

Borrow area restoration involves the creation of wetlands and tallgrass prairies across the southeast portion of the Fernald site. Grading and seeding for Area 1 (Phase II) Subareas 3, 4, and 8 of this project were completed in 2005. Grading, vegetation installation, and seeding in the Area 1 (Phase II) Subareas 5, 6, and 7 will be conducted in 2006, completing the borrow area restoration

Ecological restoration monitoring has been divided into two phases: the Implementation Phase and the Functional Phase. Implementation Phase monitoring is conducted to ensure that restoration projects are completed as intended in their designs. This effort involves the mortality counts and herbaceous cover estimates that are conducted after a project is completed. Functional Phase monitoring is more general and considers projects in terms of their contribution to the ecological community as a whole. This is accomplished by comparing projects to pre-remediation baseline conditions and to ideal reference sites. Mortality and herbaceous cover thresholds are described in the 2002 Consolidated Monitoring Report for Restored Areas at the Fernald Closure Project (DOE 2003b).

Restoration of the first two phases of the former production area (Areas 3A and 3B) was completed in 2005. These areas covered approximately 29 acres (11.7 hectares) of the northern portion of the former production area. Restoration included regrading the areas to create new wetland and open water areas. Both areas were seeded with native grasses and wildflowers. In addition, approximately 900 native trees and shrubs were planted.

In 2005, implementation monitoring was conducted for the Wetland Mitigation Project (Phase II). Mortality counts and herbaceous cover estimates were calculated across the project area. Overall plant survival within the project is approximately 80 percent. The use of deer exclusion fencing has proven very beneficial in the Wetland Mitigation Project (Phase II). Water levels were also measured to monitor the performance of the newly constructed wetlands in the project area.

Functional monitoring involved comparisons of restored forest communities to baseline conditions and to reference sites in the Southern Waste Units, Area 8 (Phase II), and Area 1 (Phase III). In general, results have met expectations. The Southern Waste Units and Area 8 (Phase II) are showing improvement over baseline conditions. The 2005 data for Area I (Phase III) are comparable to the baseline successional woodlot. Overall, vegetation survey results and field observations indicate that restoration activities have dramatically improved the project area.

Created wetlands like this vernal pool provide habitat for a wide variety of amphibians and other wildlife.

7.4 Cultural Resources

The Fernald site and surrounding area are located in a region of rich soil with many sources of water, such as the Great Miami River. Because of its advantageous location, the area was settled repeatedly throughout prehistoric and historic time, resulting in richly diverse cultural resources. In summary, 148 prehistoric and 40 historic sites have been identified within 1.24 miles (2 km) of the Fernald site.

Several laws have been established to protect cultural resources during remedial activities at the Fernald site. The National Historic Preservation Act requires DOE to take into consideration the effects of its actions on sites that are listed or eligible for listing on the National Register of Historic Places. The Native American Graves Protection and Repatriation Act requires that prehistoric human remains and associated artifacts be identified and returned to the appropriate Native American tribe.

To comply with these laws, DOE conducts archeological surveys prior to remediation activities in undeveloped areas of the Fernald site. Figure 7-2 shows the areas of the Fernald site that have been surveyed. These surveys have resulted in the identification of six sites that may be eligible for listing on the National Register of Historic Places. None of these sites were impacted by remediation activities and no additional surveys were required in 2005.

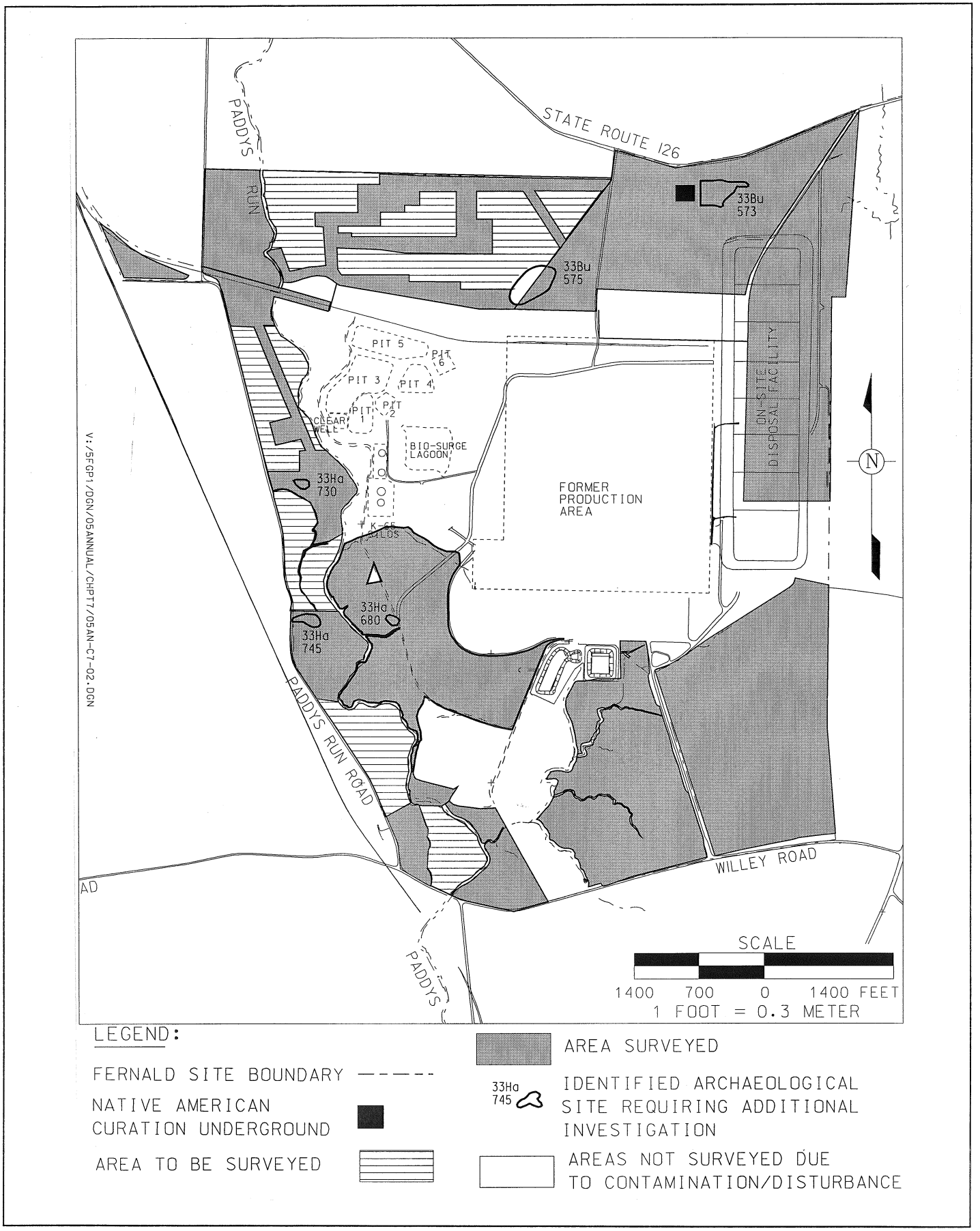

Figure 7-2. Cultural Resource Survey Areas