## 4.7 NATURAL RESOURCES

### 4.7.1 Terrestrial Ecology, Biodiversity, and Wildlife Habitat

Because of their relatively high value with respect to wildlife habitat and wildlife corridors, forest communities of the study area are relatively more significant to the regional ecology and biodiversity as compared to agricultural lands and transitional lands. This is especially true of larger contiguous forest tracts harboring significant acreage of interior forest habitat. Because of their contribution to the regional economy, agricultural lands and forest lands (because of their potential contribution to marketable timber resources of the region) are considered to be significant natural resources in areas other than wildlife habitat. Transitional lands rate lowest in relative value from the perspective of both economy and ecology.

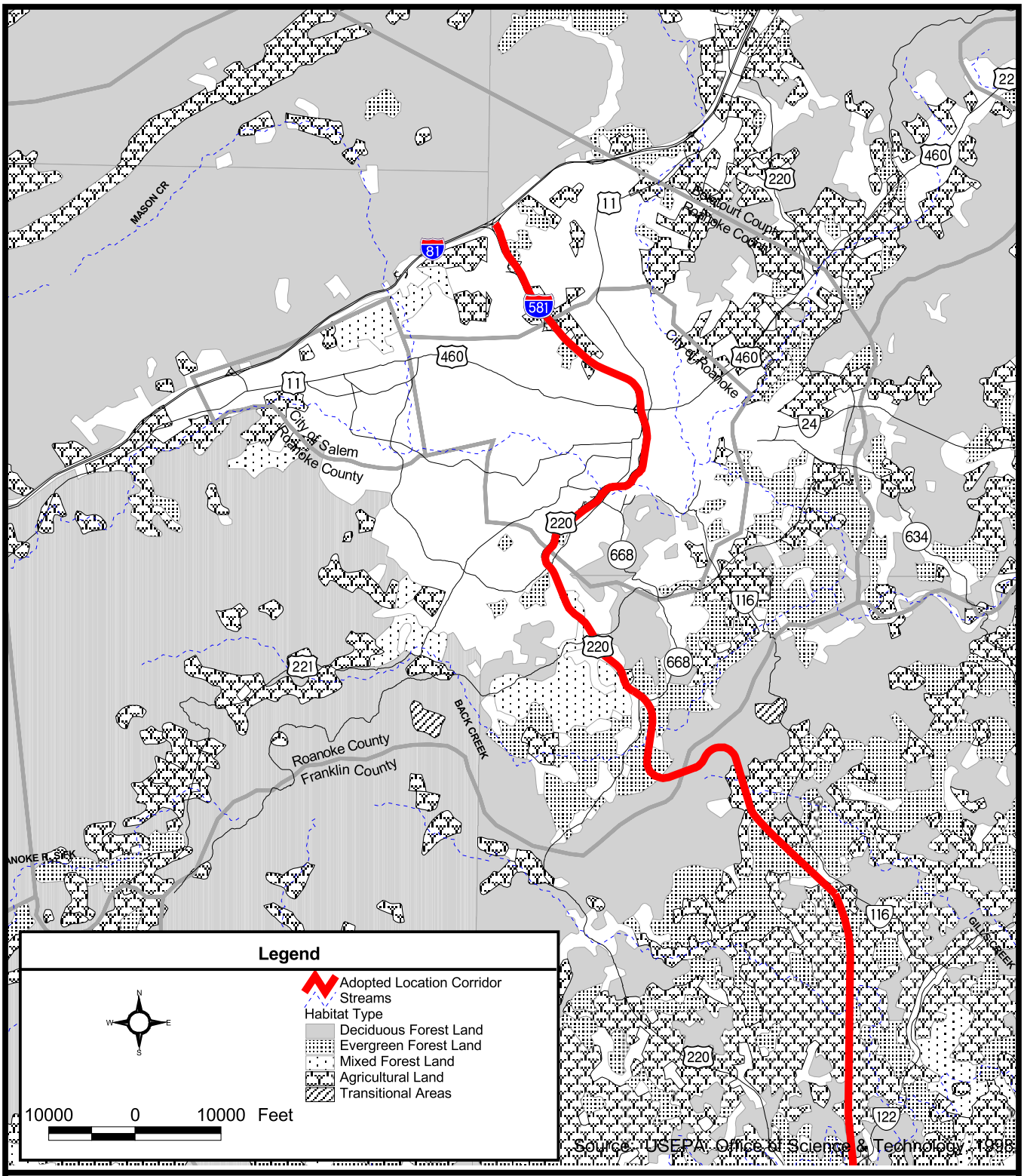
As discussed in section 3.11, the long history of human development, sylvicultural activities, and agricultural activities within the region has resulted in mosaic land coverage across large portions of the study area. Taken together, the pattern of cleared farmlands, transitional areas, remnant tree stands, and the few riparian corridors remaining along larger stream courses contribute to a level of regional biodiversity that is of general biodiversity significance in both structure and function. Because they contain significant acreages of interior forest habitat, the most important features contributing to regional biodiversity are those larger contiguous forest tracts in western Roanoke County (in the Poor Mountain vicinity), along the Bedford/Roanoke/Franklin county line (generally along the Blue Ridge Parkway), along Grassy Hill, along Fork Mountain, and along Turkeycock Mountain (Figures 4.7-1 through 4.7-3). The larger number of smaller fragmented forest tracts dispersed throughout the study area cumulatively contributes to regional biodiversity, particularly those connected by riparian corridors along major watercourses. The patchwork of forested and non-forested land coverage encountered across larger portions of the study area provide a certain degree of landscape diversity and edge habitat – a situation that also contributes to regional biodiversity. Agricultural lands and associated edge habitat potentially affected by the ALC are also shown in Figures 4.7-1 through 4.7-3. Figures showing agricultural lands affected by previously considered alternatives are provided in the DEIS and the Natural Resources Technical Report (VDOT, 2000).

Terrestrial dominated “conservation sites” that have been assigned a biodiversity rank value by the Virginia Division of Natural Heritage (DNH) based on the presence and number of natural heritage resources they contain are listed in section 3.7.2 of this EIS. Conservation sites that would be affected by the TSM Alternative or one of the Build Alternative Options are listed in Table 4.7.1. DNH-ranked “stream conservation units” are discussed in following sections.

**Table 4.7-1**
**BIODIVERSITY RANKED CONSERVATION SITES AFFECTED**

| Site Name | Biodiversity Ranking | Legal Status of Species Contained Within | Encroaching Alternative(s) |
|---|---|---|---|
| Riverside | B2 (Very High Significance) | Non-Listed | Build Option 4 |
| Dixie Cliff | B2 (Very High Significance) | Non-Listed | Build Option 4 |
| Poor Mountain | B2 (Very High Significance) | State Listed | Build Option 4 |
| Grassy Hill | B2 (Very High Significance) | Federally Listed | TSM Alternative (westward improvements only), Build Option 1a, Build Option 3, 3a, 3b, and 3c (westward improvements only), Build Option 4 |
| Bald Knob – Rocky Mount | B2 (Very High Significance) | Non-Listed | Build Option 3, 3a, 3b, and 3c (westward improvements only) |
| Brier Mountain | B3 (High Significance) | Non-Listed | None |
| Smith River Rt. 682 Slopes | B4 (Moderate Significance) | Non-Listed | None |

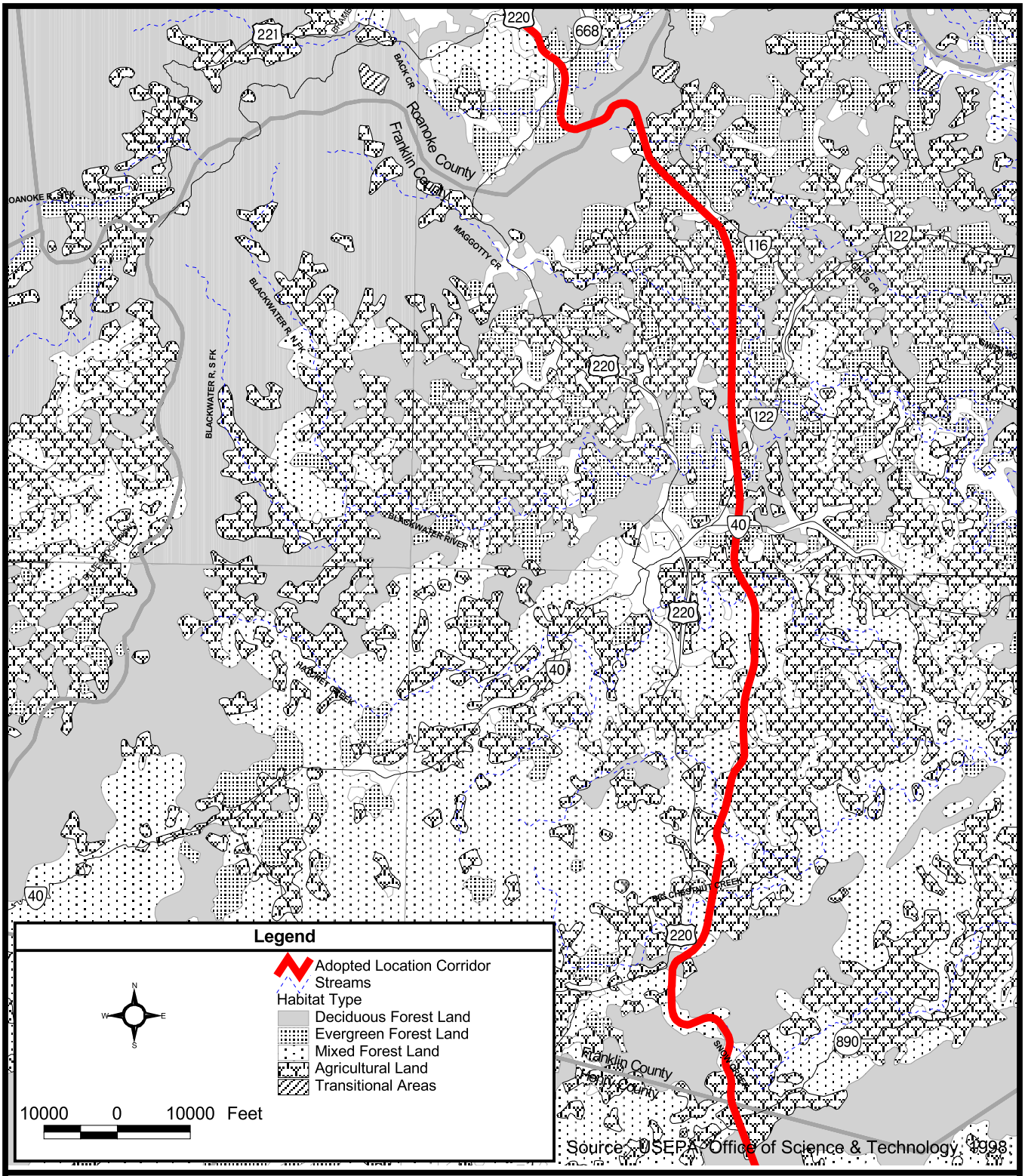
Source: Virginia Department of Conservation and Recreation, Division of Natural Heritage, November 2002; PBQD, 2002.




FUTURE 73

**I-73 Location Study**

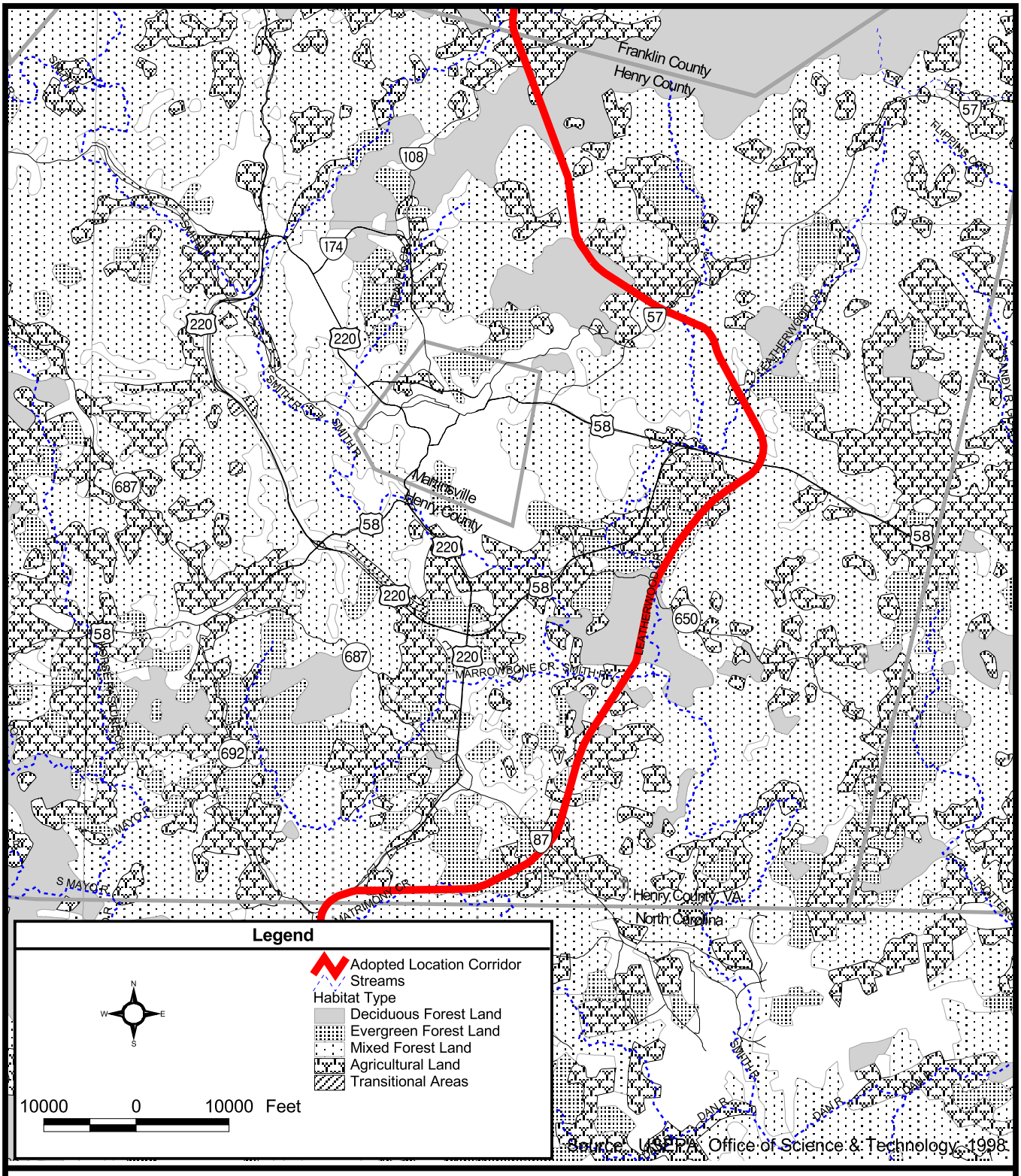
**FIGURE 4.7-1**
**TERRESTRIAL WILDLIFE HABITAT OF ROANOKE COUNTY AND CITY OF ROANOKE**




FUTURE 73

**I-73 Location Study**

**FIGURE 4.7-2**
**TERRESTRIAL WILDLIFE HABITAT OF FRANKLIN COUNTY**




FUTURE 73

**I-73 Location Study**

**FIGURE 4.7-3**
**TERRESTRIAL WILDLIFE HABITAT OF HENRY COUNTY**

Virginia currently has no forest stand protection act. No known unique or limited terrestrial systems ("unique or state significant natural communities" of DCR, Division of Natural Heritage terminology), such as the Poor Mountain and Grassy Hill NAPs, will be effected by any of the alternatives under consideration. Transportation systems can facilitate the spread of plant and animal species outside their natural range, both domestically and internationally. The introduction and spread of invasive species that are likely to harm the environment, human health, or economy are of particular concern.

#### 4.7.1.1 TSM Alternative

Upon completion of all of the TSM improvements, the TSM Alternative would result in combined impacts to 11.8 acres (4.8 hectares) of deciduous forest habitat, 5.9 acres (2.4 hectares) of evergreen forest habitat, and 79.7 acres (32.3 hectares) of mixed hardwood/pine forest habitat. In addition, the TSM Alternative will result in combined effects to 38.4 acres (15.6 hectares) of cropland and pasture. The TSM Alternative would result in combined effects to 135.8 total acres (55.1 total hectares) of terrestrial ecology and associated habitat of the region. Areas affected the TSM Alternative are listed according to land cover classification in Table 4.7-2.

The potential introduction of invasive plant species exists under the TSM Alternative. This potential exists because, under almost any type of construction project, ground-disturbing activities occur that require seeding, landscaping, and long-term maintenance. Barring appropriate preventative measures, invasive plant species can be introduced into a corridor during spraying and mowing operations. Weed seed can be inadvertently introduced into a corridor during construction on equipment or through the use of imported mulch, soil, gravel, or sod.

#### 4.7.1.2 Build Alternative

Under the Build Alternative, effects to terrestrial plant communities and associated wildlife habitat would consist of the conversion of existing land coverage to paved surfaces and public right-of-way. This conversion would result in the loss of wildlife habitat and timber resources. Using a 600-foot-wide (183-meter-wide) study corridor and preliminary interchange configurations, areas affected under each of the options under consideration are listed according to land cover classification in Table 4.7-2. For all quantities reported, it is estimated that 40 percent of the area represented by the construction limits within the 600-foot-wide (183-meter-wide) study corridor and interchanges would be converted to paved surface, while 60 percent of the area represented by the construction limits would be converted to managed vegetated right-of-way and stormwater facilities. Therefore, it is expected that the impacts identified below will be less since the constructed project would not use the entire limits of 600-foot study corridor. Construction of any Build Alternative option will affect forest lands and associated wildlife habitat. These options will also affect agricultural lands (comprised primarily of cropland and pastures), and associated wildlife habitat. Construction of all options except Options 1, 2, 2a, and 2c will affect transitional lands (consisting of fallow agricultural fields, clear-cut timbered areas, abandoned quarries, lands cleared for future development, and other open and passive land covers) and associated wildlife habitat

At 4,390.6 acres (1,776.9 hectares), Option 1 will affect the greatest area of forest lands and associated habitat. At 2,014.4 acres (815.2 hectares), Option 3c will affect the smallest area of forest lands and associated habitat. The ALC will affect 3,369.1 acres (1,363.5 hectares) of forest lands. At 2,240.7 acres (906.8 hectares), Option 2a will affect the greatest area of agricultural lands and associated habitat. At 1,202.6 acres (486.7 hectares) each, Options 3a, 3b, and 3c will affect the smallest area of agricultural lands and associated habitat. The ALC will affect 1,706.8 acres (690.7 hectares) of agricultural lands. At 66 acres (26.7 hectares), Option 4 will affect the greatest area of transitional lands and associated habitat. Options 1, 2, 2a, and 2c will affect no transitional lands or associated habitat. The ALC will affect 8.15 acres (3.3 hectares) of transitional lands.

Using county forest resource assessments published by the Virginia Department of Forestry, the total forest resources for the study area (i.e., Roanoke, Botetourt, Bedford, Franklin, and Henry counties) is estimated at 1,090,900 acres (441,473 hectares) (Virginia Department of Forestry, 1999). Forest communities lost through conversion to highway right-of-way represent 0.4 percent of the regional total under Option 1, 0.2 percent of

the regional total under Option 3c, and 0.16 percent of the regional total under the ALC. These figures represent a relatively small proportion of potentially marketable timber resources within the region. Forest communities of the type affected are widespread throughout the region; thus, mobile wildlife species inhabiting affected areas are expected to be absorbed into adjoining forest communities with no long-term adverse effects on the ability of populations to sustain healthy populations.

Without appropriate mitigation, a number of existing wildlife corridors would be bisected following construction of a new interstate. The various build alternatives could impact the larger contiguous forest tracts in western Roanoke County (in the Poor Mountain vicinity), along the Bedford/Roanoke/Franklin county line (generally along the Blue Ridge Parkway), along Grassy Hill, along Fork Mountain, or along Turkeycock Mountain. The Poor Mountain forest tract is located northwest of existing U.S. Route 221 and east of the cities of Salem and Roanoke and is, thus, not contiguous to forest tracts located within areas that would be affected by the ALC.

**Table 4.7-2**
**TERRESTRIAL ECOLOGY AND HABITAT**

| Option | | Forest Type in acres (hectares) | | | | Agricultural Lands in acres (hectares) | | | Transitional Lands in acres (hectares) |
|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Evergreen | Mixed Hardwood /Pine | Total | Cropland and Pasture | Orchards, Vineyards, etc. | Total | Total |
| TSM | | 11.8 (4.8) | 5.9 (2.4) | 79.7 (32.3) | 97.4 (39.5) | 38.4 (15.6) | 0.0 (0.0) | 38.4 (15.6) | 0.0 |
| Build Alternative Options | 1 | 1,756.5 (710.9) | 624.4 (252.7) | 2,009.7 (813.3) | 4,390.6 (1,776.9) | 2,158.2 (873.4) | 18.5 (7.5) | 2,176.7 (880.9) | 0.0 |
| | 1a | 1,754.4 (710.1) | 779.8 (315.6) | 1,792.0 (725.2) | 4,326.2 (1,750.9) | 2,099.1 (849.5) | 18.5 (7.5) | 2,117.6 (857.0) | 4.0 (1.6) |
| | 2 | 663.4 (268.5) | 946.5 (383.1) | 1,791.9 (725.2) | 3,401.8 (1,376.8) | 2,161.4 (874.7) | 0.0 | 2,161.4 (874.7) | 0.0 |
| | 2a | 594.6 (245.7) | 822.9 (333.0) | 1,791.9 (725.2) | 3,209.4 (1,303.9) | 2,240.7 (906.8) | 0.0 | 2,240.7 (906.8) | 0.0 |
| | 2b | 583.6 (236.2) | 768.6 (311.1) | 1,825.3 (738.7) | 3,177.5 (1,285.9) | 2,071.0 (838.1) | 0.0 | 2,071.0 (838.1) | 8.15 (3.3) |
| | 2c | 575.7 (233.0) | 946.5 (383.1) | 1,706.2 (690.5) | 3,228.4 (1,306.6) | 2,105.8 (852.2) | 0.0 | 2,105.8 (852.2) | 0.0 |
| | 3 | 534.5 (216.3) | 464.5 (188.0) | 1,063.5 (430.4) | 2,062.5 (834.7) | 1,202.6 (486.7) | 0.0 | 1,202.6 (486.7) | 34.8 (14.1) |
| | 3a | 837.4 (338.9) | 374.1 (151.4) | 1,030.1 (416.9) | 2,241.6 (907.2) | 1,202.6 (486.7) | 0.0 | 1,202.6 (486.7) | 26.7 (10.8) |
| | 3b | 635.8 (257.3) | 459.8 (186.1) | 1,063.5 (430.4) | 2,159.1 (873.8) | 1,202.6 (486.7) | 0.0 | 1,202.6 (486.7) | 34.8 (14.1) |
| | 3c | 454.7 (184.0) | 481.4 (194.8) | 1,078.3 (436.4) | 2,014.4 (815.2) | 1,247.4 (504.8) | 0.0 | 1,247.4 (504.8) | 34.8 (14.1) |
| | 4 | 1,499.7 (606.7) | 397.6 (160.9) | 1,515.5 (613.3) | 3,412.8 (1,380.9) | 1,466.6 (593.5) | 53.4 (21.6) | 1,520.0 (615.1) | 66.0 (26.7) |
| | ALC | 802.3 (324.7) | 739.7 (299.4) | 1,827.1 (739.4) | 3,369.1 (1,363.5) | 1,706.8 (690.7) | 0.00 | 1,706.8 (690.7) | 8.15 (3.3) |

One individual who commented on the draft EIS pointed out that noise could have ecological impacts on birds, also. Dr. Richard Forman, a landscape ecologist at Harvard Design School has apparently done research on the impacts that noise has on birds and their nesting habits. Dr. Forman has found the density and diversity of birds to be one-third lower in traffic noise zones than in other areas. It is believed that noise tends to muffle and thus interfere with the communication of the birds. Therefore, it appears that in addition to direct impacts to bird habitat which reduces the area where birds can nest, there are additional impacts, or edge impacts, along a roadway that could also impact bird nesting habits and further reduce the area over

which birds are willing to nest. As discussed in Section 4.4, a noise analysis was developed for the project in accordance with FHWA regulations at 23 CFR § 772, which provides noise procedures for noise studies and the consideration of noise abatement measures designed to protect public health and welfare. Other than to note that the potential edge impact of noise on birds that may occur beyond the construction limits of the project, FHWA has not established procedures for assessing or mitigating non-public noise impacts such as impacts to birds.

The potential introduction of invasive plant species exists under each of the Build Alternatives. This potential exists because, under almost any type of construction project, ground-disturbing activities occur that require seeding, landscaping, and long-term maintenance. Barring appropriate preventative measures, invasive plant species can be introduced into a corridor during spraying and mowing operations. Weed seed can be inadvertently introduced into a corridor during construction on equipment or through the use of imported mulch, soil, gravel, or sod.

#### 4.7.1.3 Mitigation

Mitigation Measures That Can Be Implemented and Managed Directly by VDOT

Provision of a right-of-way for construction of a new interstate would convert a portion of forest lands and agricultural lands to successional herbaceous and shrub communities similar to those described in Section 3.7 of this report (Transitional Lands). Features designed to intentionally provide wildlife habitat or to attract wildlife will not be included in vegetation establishment/management plans developed for rights-of-way; however, it is anticipated that use of vegetated rights-of-way will lead to the creation of forest edge habitat that will intrinsically have certain limited amounts of wildlife habitat values (particularly for bird species). To mitigate these unavoidable effects, wildlife fencing will be installed as needed and the use of plant species having high wildlife feeding values will be avoided or minimized to the maximum extent practicable. Cut and fill will be minimized to the minimum extent necessary to ensure structural stability of the roadway and appurtenant features. The implementation of BMPs for erosion and sediment control will minimize secondary impacts to adjoining communities and habitat.

Until the National Vegetation Management Plan specified by the Executive Order is completed, the NEPA analysis will rely on the State noxious-weed list to define the invasive plants that must be addressed and the measures to be implemented to minimize their harm. VDOT will not plant any of the prohibited noxious-weed seeds from the statewide list. All seeds used by VDOT are tested in accordance with the Virginia Seed Law and VDOT's standards and specifications to ensure that there are no prohibited noxious-weed seeds in their seed mixes. VDOT will work with the Virginia Department of Agriculture and Consumer Services to implement a plan to restrict the spread of invasive species if any are found in the project area. Preventative measures that will be employed include the inspection and cleaning of construction equipment, commitments to ensure the use of invasive-free mulches, topsoils and seed mixes, the VDOT requirement that cut slopes be seeded within 48 hours of being exposed, and eradication strategies to be deployed should invasion occur.

Where feasible, passageways for terrestrial and riparian wildlife will be provided and maintained beneath proposed bridges and certain elevated structures to help minimize effects of wildlife corridor bisection. In addition, the Virginia Department of Conservation and Recreation is working on the Virginia Conservation Lands Needs Assessment Project where they are prioritizing ecologically important habitats and corridors in Virginia. VDOT is committed to coordinating with the VDCR to identify the ecologically important corridors that would be impacted by I-73 and is committed to considering design measures that will maintain and minimize impacts to such corridors. Further, fencing will be employed to help minimize vehicle-wildlife collisions and to help direct wildlife towards maintained passageways. Practicable mitigation measures to minimize effects of habitat fragmentation and vehicle-wildlife collisions will be further developed and designed prior to preparation of permit applications.

Under the Migratory Bird Treaty Act (MBTA), it is unlawful to deliberately or intentionally take migratory birds protected under the act; violators of the Act could face criminal prosecution. A take is defined "To pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out those activities." Birds protected

under the Act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves, and pigeons, swifts, martins, swallows, and others.

Habitat destruction or alteration does not constitute a take under the MBTA as long as there is no direct take of birds, nests, eggs, or parts thereof. Activities associated with road construction which most likely could result in a take of migratory birds include, but are not limited to, clearing and grubbing of migratory bird nesting habitat during the nesting season when eggs or young are likely to be present and bridge demolition or reconstruction where birds are present.

There are numerous migratory birds that occupy or pass through the study area. Of these seven have been identified as species of management concern because of loss of habitat. The habitat utilized by these birds include agricultural, forested and aquatic. As documented in the EIS, the proposed project will impact approximately 3,300 acres of forested land and approximately 1,700 acres of agriculture, pasture, and open areas based on a 600-foot location corridor. Despite these acreage totals, these impacts represent a very small percentage of the overall forested and agricultural lands available in the study area that can be utilized by migratory birds. For this reason, it is not expected that impacts of this magnitude to migratory bird habitat will adversely affect those species at the population level. According to the summary of secondary impacts (Table 4.11-3), an additional 5,500 acres of forested and agricultural land could be lost if development occurs within a one-mile radius around interchanges. Even with the possibility of these additional acreage impacts from secondary development, it is not expected that these habitat impacts will adversely affect migratory birds at the population level given the prevalence of forested and agricultural/pasture resources in the study area.

When entering into a contract with a contractor, VDOT will need to notify them of the criminal penalties associated with taking migratory birds. In order to minimize and avoid impacts to migratory birds during construction, the contractor will not be allowed to disturb, destroy, or remove active nests during the nesting season. The removal of unoccupied or inactive nests from the construction site will be avoided where practicable, and the contractor will not be permitted to collect, capture, relocate, or transport migratory birds, eggs, young, or active nests without a permit. Further, VDOT is committed to using vegetation along disturbed roadways that do not attract migratory birds and is committed to riparian restoration in coordination with the U.S. Fish and Wildlife Service.

Mitigation Measures Requiring Multi-Jurisdictional Implementation Instruments

USFWS, in its 11 September 2002 correspondence, recommended that impacts to upland forest habitat and associated adverse effects upon regional biodiversity be mitigated through such means as habitat restoration/enhancement, conservation initiatives, riparian corridor restoration, establishing vegetated buffers along field edges for edge habitat, and upland forest corridor restoration. Payment-in-lieu to the Virginia Department of Game and Inland Fisheries for purchase of lands for preservation and enlargement of the Turkeycock and/or Havens Wildlife Management Areas will be pursued as mitigation for habitat impacts by VDOT and FHWA, with the amount of acreage to be preserved to be determined by FHWA and VDOT should the project proceeds towards construction."

### 4.7.2 Aquatic Ecology, Biodiversity, and Wildlife Habitat

Effects to aquatic habitat (water body modifications) addressed under this section includes those primary or direct effects to certain waters of the U.S. (i.e., those other than wetlands) and deepwater habitat. Secondary and cumulative effects are discussed in section 4.12. Wetlands have been addressed under separate sections, as a specific category of waters of the U.S. Major aquatic systems assessed as part of this study include intermittent stream systems, perennial stream systems, isolated palustrine open water systems (primarily farm ponds), and lacustrine waters (Smith Mountain Lake). As community types mapped under the NWI program, acres of palustrine open water systems and the one lacustrine system impacted within the study area are quantified in Table 4.7-6 of this report. Water quality of study area streams is discussed in Sections 3.6 and 4.6 of this report.

Past studies indicate that most stream corridor degradation can be directly attributed to land use practices and/or hydrologic changes at the watershed level that cause fundamental disruption of ecosystem functions (Beschta et al., 1994). Although roadway construction can contribute to changes at the watershed level (through both direct effects and secondary cumulative effects), roadways comprise only one of many factors contributing to these changes. Agricultural and sylvicultural activities involve land use practices which are not necessarily dependent upon a well-developed roadway network capable of conveying large volumes of traffic, and are activities documented to contribute most heavily to nonpoint pollution in the region. By comparison, urbanization is another source of nonpoint pollution that has been shown to be intrinsically linked to road construction. As discussed in section 3.7.3, riparian corridors dispersed throughout the study area cumulatively contribute to regional biodiversity in an important way. The biodiversity of a large number of streams has, however, been adversely affected by nonpoint pollution (increased sedimentation, nutrient loading, and fecal coliform counts) over a long history of agricultural practices – particularly those associated with livestock management.

"Stream conservation units" that have been assigned a biodiversity rank value by the Virginia Division of Natural Heritage based on the presence and number of natural heritage resources they contain are listed in section 3.7.3 of this EIS. Conservation sites that would be affected by the TSM Alternative or one of the Build Alternative Options are listed in Table 4.7.3.

**Table 4.7-3**
**BIODIVERSITY RANKED STREAM CONSERVATION UNITS AFFECTED**

| Site Name | Biodiversity Ranking | Legal Status of Species Contained Within | Encroaching Alternative(s) |
|---|---|---|---|
| Roanoke River – Riverside SCU | B2 (Very High Significance) | Federally Listed | Build Option 4 |
| Roanoke River – Mill Race SCU | B3 (High Significance) | State Listed | None |
| Pigg River – Furnace Creek SCU | B2 (Very High Significance) | Federally Listed | None |
| Big Chestnut Creek – Pigg River SCU | B2 (Very High Significance) | Federally Listed | TSM Alternative, Build Option 1 (3 crossings), Build Options 2, 2a, 2b, and 2c, Build Options 3, 3a, and 3b; the ALC |
| Smith River – Jordan Creek SCU | B4 (Moderate Significance) | Federally Listed | TSM Alternative, Build Options 3, 3a, 3b, and 3c (2 crossings); Build Option 4 (2 crossings) |

Source: Virginia Department of Conservation and Recreation, Division of Natural Heritage, November 2002; PB, 2002.

Perennial streams reported to support populations of the federal listed endangered species (Roanoke logperch) and the state listed threatened species (orangefin madtom) were determined to be the most significant aquatic habitats within the study area (DGIF, 1999; DCR, Division of Natural Heritage, 1999, 2000). Other than the aforementioned habitat, no rare or unique aquatic habitat ("unique or state significant natural communities" of DCR, Division of Natural Heritage terminology) will be affected by any of the alternatives under consideration.

#### 4.7.2.1 TSM Alternative

Sixteen perennial streams and nine intermittent streams would be cumulatively affected upon completion of all the TSM constituent projects (Table 4.7-4). Effects to streams would include filling of streambed and alteration of stream banks for road fill and conversion of streambed to concrete or corrugated metal pipe culvert surface. The TSM Alternative would result in losses to aquatic habitat associated with isolated impounded palustrine habitat and aquatic habitat associated with riverine habitat at 0.2 percent and 0.1 percent of the regional totals, respectively (see category PUBHh and R2/3UBH of Table 4.7-6).

#### 4.7.2.2 Build Alternative

Construction of any of the options comprising the Build Alternative will require the unavoidable crossing of intermittent streams and perennial streams, and associated aquatic habitat (categories R2/3UBH Table 4.7-6). In addition, Build Alternative options 1 and 1a would affect one lacustrine deepwater habitat (a narrow headwater portion of Smith Mountain Lake) and associated aquatic habitat (category L1/2UBHh of Table 4.7-6). Streams will be bridged, culverted, or relocated according to site-specific conditions. For this study, it is assumed that all intermittent streams, all small-sized perennial streams, and some medium-sized perennial streams will be culverted and, in some cases, relocated. Benthic habitat presently found at locations of these proposed stream crossings will be temporarily disturbed and, for the most part, will be replaced with metal or concrete culverts which will be countersunk (over-excavated). Fill will be placed upon stream banks and stream bottoms to accommodate culvert installation. In cases where streams extend parallel to or nearly parallel to the proposed interstate, streams will be relocated. Stream relocation will involve replacement of the natural stream channel with a man-made channel designed to replicate as many of the functions of the natural stream channel as feasible. Bridges would be constructed at those major stream crossings listed in Table 4.7-4.

It should be noted that acreage listed in Table 4.7-6 under riverine habitat (R2/3UBH) and lacustrine habitat (L1UBHh) is intended to convey an affect (such as shading) but is not intended to imply a loss of these resources to the extents listed. It is fully intended that these resources will be spanned on structure (bridges) and that the only physical displacement anticipated would involve placing of support structures (piers) in the water. In the absence of detailed bridge design, quantities listed are provided to serve as a basis of comparison among the various options. Quantities listed also can serve as a basis for assessing secondary impacts to deepwater habitats (stormwater discharges, shading, bank stabilization, etc.) and evaluating appropriate mitigation measures (such as means to provide water quality enhancements or stream bioengineering during the design phase).

Because they convey water throughout all or much of the year and because they support more viable and diverse aquatic faunas, perennial streams are considered to be relatively more critical as compared to intermittent streams. From the perspective of perennial stream crossings, Option 2c would result in the greatest effects to aquatic habitat (with 36 perennial stream crossings), Option 3c would result in the least effects (with 24 perennial stream crossings), and the ALC would result in 31 perennial stream crossings. Areas affected and severity of effects from a regional perspective are detailed in Table 4.7-6 under the category labeled "R2/3UBH". Aquatic habitat of perennial streams supporting populations of threatened or endangered fish species are discussed in greater detail in Section 4.7.5.

Segment 372 of Options 1 and 1a is the only segment within the study area that will involve crossing of lacustrine waters (a narrow headwater portion of Smith Mountain Lake). This segment will cross the narrow reach of Smith Mountain Lake on structure (bridge). Several hundred square feet (tens of square meters) of aquatic habitat (reservoir bottom) will be lost if either of these options are selected. Considering the large area of similar reservoir bottom habitat occurring within Smith Mountain Lake, this effect is not considered to be severe.

All Build Alternative options will result in loss of relatively low value aquatic habitat associated with isolated palustrine open water habitats (primarily farm ponds). These habitats are also identified as impounded or dike palustrine wetlands with unknown bottoms (PUBH) under the NWI program. Areas of habitat associated with PUBH's and the severity of habitat loss from the perspective of total similar within the region are provided in Table 4.7-6. At a maximum loss of 1.2 percent of the regional total (under Build Alternative Option 1), the loss of this type of habitat is not considered severe.

**Table 4.7-4**
**STREAM AND AQUATIC HABITAT EFFECTS**

| Alternative / Option | | Intermittent Streams | | Perennial Streams (Including Rivers) | | Major River Crossings |
|---|---|---|---|---|---|---|
| | | Number Crossed | Length Affected[1] ft (m) | Number Crossed | Length Affected[1] ft (m) | |
| TSM | | 9 | 7,203 (2,196) | 16 | 12,742 (3,885) | Pigg R. at US 220; Blackwater R. at US 220; Smith R. south of Martinsville. |
| Build Alternative Options | 1 | 134 | 80,432 (24,522) | 32 | 19,208 (5,856) | Roanoke R. east of Explore Park; Blackwater R.; Pigg R. south of Redwood; Smith R. east of Eagleston Falls. |
| | 1a | 130 | 78,031 (23,790) | 34 | 20,408 (6,222) | Roanoke R. east of Explore Park; Blackwater R. west of Gogginsville; Pigg R. at Rt 40; Smith R. east of Eagleston Falls. |
| | 2 | 79 | 47,419 (14,457) | 35 | 21,008 (6,405) | Roanoke R. near Riverland neighborhood; Blackwater R. north of Rt 122; Pigg R. south of Hodgesville; Smith R. east of Eagleston Falls. |
| | 2a | 78 | 46,819 (14,274) | 35 | 21,008 (6,405) | Roanoke R. near Riverland neighborhood; Blackwater R. north of Rt 122; Pigg R. south of Hodgesville;Smith R. east of Eagleston Falls. |
| | 2b | 78 | 46,819 (14,274) | 33 | 19,808 (6,039) | Roanoke R. at US 220; Blackwater R. north of Rt 122; Pigg R. south of Hodgesville; Smith R. east of Eagleston Falls. |
| | 2c | 78 | 46,819 (14,274) | 36 | 21,609 (6,588) | Roanoke R. at US 220 ; Blackwater R. north of Rt 122; Pigg R. south of Hodgesville; Smith R. east of Eagleston Falls. |
| | 3 | 53 | 31,813 (9,699) | 26 | 15,606 (4,758) | Roanoke R. at US 220; Blackwater R. north of Grassy Hill; Pigg R. south of Rt 40; Smith R. north of Rt 682/ Alternate Rt 57 and US Rt 220 interchange. |
| | 3a | 51 | 30,612 (9,333) | 25 | 15,006 (4,575) | Roanoke R. at US Rt 220; Blackwater R. north of Grassy Hill; Pigg R. south of Rt 40; Smith R. north of Rt 682/ Alternate Rt 57 and US 220 interchange. |
| | 3b | 55 | 33,013 (10,065) | 25 | 15,006 (4,575) | Roanoke R. at US 220; Blackwater R. north of Grassy Hill; Pigg R. south of Rt 40; Smith R. north of Rt 682/ Alternate Rt 57 and US 220 interchange. |
| | 3c | 55 | 33,013 (10,065) | 24 | 14,406 (4,392) | Roanoke R. at US 220; Blackwater R. north of Grassy Hill, Pigg R. south of Rt 40 on US 220 Rocky Mount Bypass; Smith R. north of Rt 682/ Alternate Rt 57 and US 220 interchange. |
| | 4 | 67 | 40,219 (12,262) | 31 | 18,607 (5,673) | Roanoke R. in western Roanoke Co. south of Salem and east of Rt 639; Blackwater R. southwest of Gogginsville; Pigg R. at Rt 40 west of Rocky Mount; Smith R. west of Rt 57/ Alternate Rt 57 connector. |
| | ALC | 81 | 44,429 (13,542) | 31 | 18,012 (5,490) | Roanoke R. near US 220; Blackwater R. north of Rt 122; Pigg R. south of Hodgesville; Smith R. east of Fishers Farm Park. |

Note: [1] Length as measured from I-73 Location Study Orthophotos and alternatives mapping.

Although of less importance to aquatic habitat, cumulative impacts resulting from the crossing of numerous intermittent streams can be critical with respect to overall watershed management. Option 1 would involve the greatest number of intermittent stream crossings (134), Option 3a would involve the least number of intermittent stream crossings (with 51), and the ALC would involve the crossing of 81 intermittent streams. Option 3c, which would result in the fewest number of perennial stream crossings, would also result in a relatively small number of intermittent stream crossings (51 for Option 3a as compared to 55 for Option 3c).

A bridge crossing over class ii natural trout waters of the Smith River will be required under Segment 237B of Build Alternative Option 4. A bridge crossing over class ii natural trout waters of the Smith River will be required under Segment 388 of Build Alternative Options 3, 3a, 3b, and 3c. A bridge crossing over or culvert installation within class iii natural trout waters of Glade Creek will be required under Segment 372 of Build Alternative Options 1 and 1a. A bridge crossing over unclassified stockable trout waters of the Roanoke River will be required under Segment 371 of Build Alternative Option 4. A bridge crossing over or culvert installation within class vi stockable trout waters of Maggodee Creek will be required under Segment 379 of Build Alternative Options 3, 3a, 3b, and 3c; Segment 394 of Build Alternative Option 4, and; Segment 397 of Build Alternative Options 3, 3a, 3b, 3c, and 4. The ALC will not interfere with any recreational opportunities associated with trout fishing in these waters. Specifically, the ALC will not cross any waters classified as class ii natural trout waters, class iii natural trout waters, unclassified stockable trout waters, or class iv stockable trout waters.

#### 4.7.2.3 Mitigation

Mitigation Measures That Can Be Implemented and Managed Directly by VDOT

Design plans for the selected alternative will employ feasible measures to avoid and minimize impacts to aquatic habitat (including trout waters). Compensation measures for unavoidable impacts will be developed during the permit process. Minimization measures will be included in the final design plans.

Pollution prevention plans will be developed as part of the “General Permit” required under the VPDES program. Under the pollution prevention plan, all reasonable measures will be employed to prevent to the release of fuels, lubricants, and other contaminants into waters of the State. All fill used for culvert and bridge construction will consist of clean, non-erodible lithic materials. Should work in waters containing critical fish populations (such as the Roanoke logperch or the orangefin madtom) be necessary, measures to minimize unavoidable impacts will be developed through consultation with the FWS or DGIF, respectively. On previous VDOT roadway projects involving stream crossings in the vicinity of Roanoke logperch or the orangefin madtom habitat, impacts have been minimized by (1) limiting the number of piers within the streambed to the absolute minimum needed to ensure structural stability, (2) limiting abutment fill to areas above ordinary high water, (3) employing silt fences, siltation curtains, and other practicable means to provide erosion and sedimentation control, (4) removing fill placed for temporary construction causeways followed by restoring preconstruction streambed conditions immediately following construction, and (5) limiting certain construction activities during the spawning period of mid-April through May. However, the presentation of new information to the FWS recently has led to new concerns about the long term viability of the Roanoke logperch raising questions whether past practices for minimizing impacts in the vicinity of Roanoke logperch habitat will be sufficient.

Following construction, a number of mitigation measures will be maintained to minimize impacts associated with ongoing use and maintenance of the interstate. Use of structural components requiring painting will be minimized to the fullest degree practicable in the vicinity of stream crossings. All stormwater management facilities will be properly maintained and periodically serviced (such as periodic dredging of retention/detention basins) to ensure appropriate function in the protection of water quality on a long-term basis. Use of pesticides and herbicides will be avoided to the fullest degree practicable in areas draining to critical fish habitat and public water supplies. Erosion and sediment control measures will be fully maintained until such time that all exposed or potentially erodible land surfaces have been effectively stabilized. A more-detailed discussion of available and proposed measures to mitigate water quality degradation within aquatic habitat of the study areas is presented in sections 4.6.3.3 and 4.6.3.4 of this EIS. Efforts to mitigate impacts to the aquatic habitat of the Roanoke logperch is addressed in Section 4.7.5 of the EIS and the biological assessment that has been prepared for the Roanoke logperch.

Mitigation Measures Requiring Multi-Jurisdictional Implementation Instruments

USFWS in its 11 September 2002 correspondence recommended that riparian (i.e., stream) restoration/enhancement be implemented to offset negative impacts associated with the proposed project. Stream segments within the study area recommended by USFWS for riparian restoration include the Pigg River and Big Chestnut Creek in Franklin County and the Smith River in Henry County. Stream segments outside the study area recommended by USFWS for riparian restoration include the North Fork and South Fork of the Roanoke River in Montgomery County; the South Fork and the North Fork of the Mayo River in Henry and Patrick counties; and the Smith River in Patrick County.

A stream corridor is an ecosystem that typically consists of the following three major elements: (1) the stream channel, (2) the floodplain, and (3) the transitional upland fringe (USDA, NRCS, 1998). Stream corridor restoration would have limited long-term effectiveness unless chronic land uses can be controlled or moderated within the entire watershed and unless all key elements of the stream system (such as headwaters) are included in the restoration plan (USDA, NRCS, 1998). Considering the fact that the vast majority of lands comprising the various watersheds within the I-73 study area are privately owned and, considering the infeasibility of VDOT being able to acquire expanses of land large and contiguous enough to render stream restoration effective, this option is not considered viable through direct implementation by VDOT. Instead, payment in-lieu into a comprehensive landscape management program administered by the Natural Resources Conservation Service, the Virginia Department of Conservation and Recreation, or The Nature Conservancy will be pursued as mitigation if the project proceeds toward construction. The preferred area for mitigation efforts involving riparian corridor restoration and/or preservation is the Big Chestnut Creek – Pigg River Stream Conservation Unit (SCU) located just downstream of U.S. 220 in central Franklin County. This SCU not only supports several populations of Roanoke logperch, but also contains stream segments that are impaired due to high fecal coliform counts and sedimentation resulting largely from agricultural runoff. Such measures would be consistent with the "Resource Protection" mission goal of the Blueprint for the Future of Migratory Birds: Migratory Bird Program: Strategic Plan 2004-2014 (U.S. Dept. of the Interior, Fish and Wildlife Service, 2004).

### 4.7.3 Waters of the U.S., Including Wetlands

#### 4.7.3.1 Navigable Waters (Section 10 Waters)

Navigable waters of the region are viewed for their importance to recreational boating. Potential effects to navigable waters will be evaluated by the COE as part of their public interest review (in this case, under Section 10 of the Rivers and Harbor Act of 1899) and the U.S. Coast Guard for proposed bridge construction permits. The presence of navigable waters was determined using the unpublished list of navigable waters of Virginia (Norfolk District COE, 1988). Because all waterways listed as navigable within the study area are larger perennial streams (rivers), stream crossings will be made via new bridge construction or through improvements to existing bridges.

TSM Alternative

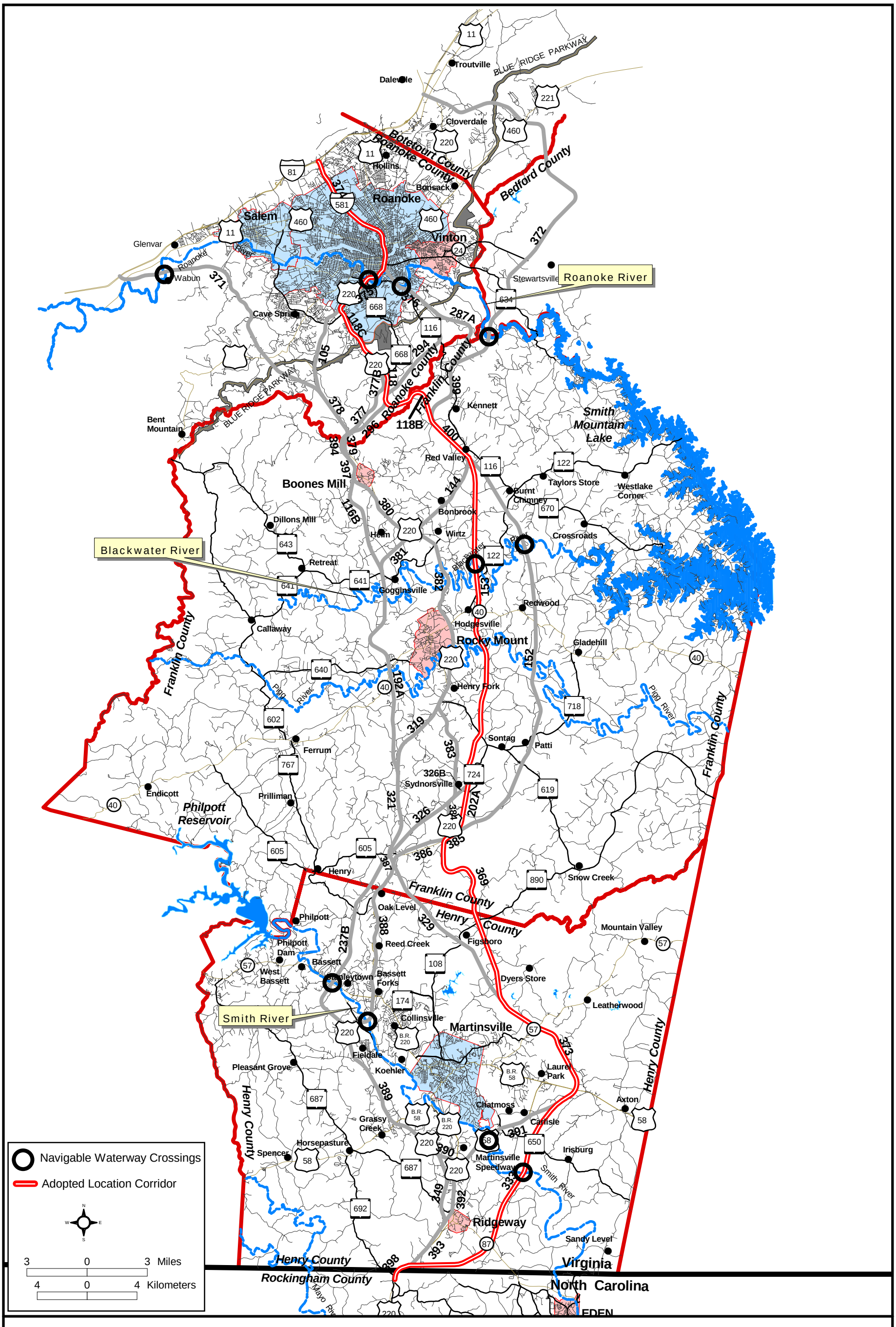
The TSM Alternative would involve crossing of the Smith River at one location. The TSM Alternative would also involve work at the U.S. Route 220 crossing of the Blackwater River in Franklin County - for a total of two navigable water crossings (Table 4.7-5). Temporary effects associated with highway construction would include construction of temporary causeways and coffer dams to accommodate bridge construction. Without adequate attention to recreation boating interests, bridge height, spacing of bridge support structures, and placement of fill to accommodate stream crossings could adversely affect navigability with respect to recreation boating opportunities. Considering the limited size of recreational watercraft utilizing the navigable waters of the study area (kayaks, canoes, and occasionally small motorcraft) and the availability of practicable mitigating measures, effects upon navigable waters is considered to be negligible. No permanent environmental consequences would result from the TSM Alternative.

Build Alternative

All Build Alternative options under consideration involve crossings of navigable waterways. Crossings of navigable waterways associated with the options variations under the Build Alternative are listed in Table 4.7-5 and are shown in Figure 4.7-4. Options 1a, 3, 3a, 3b, 3c, and 4 involve the fewest number of navigable waterway crossings (at two crossings each), while Options 1, 2, 2a, 2b, 2c, and the ALC involve the greatest number of such crossings (at three crossings each). Bridges are proposed at each of the proposed crossings, therefore, no permanent or long-term environmental consequences are anticipated to recreational boaters from the implementation of a Build Alternative.

.

(This area left blank intentionally)




FUTURE 73

**I-73 Location Study**

**FIGURE 4.7-4**
**NAVIGABLE WATER CROSSINGS**

**Table 4.7-5**
**NAVIGABLE WATER CROSSINGS**

| Option | | Number of Crossings | Name of Stream and Location of Stream Crossing | Extent of Effect |
|---|---|---|---|---|
| TSM | | 2 | Blackwater River near Rocky Mount, Smith River south of Martinsville | Negligible due to proposed construction of bridges |
| Build Alternative Options | 1 | 3 | Roanoke River east of Explore Park, Blackwater River downstream of Route 122 crossing, Smith River east of the community of Eagleston Falls | Negligible due to proposed construction of bridges |
| | 1a | 2 | Roanoke River east of Explore Park, Smith River east of the community of Eagleston Falls | Negligible due to proposed construction of bridges |
| | 2 | 3 | Roanoke River in vicinity of the Riverland neighborhood Blackwater River north of its crossing of Route 122, Smith River east of the community of Eagleston Falls | Negligible due to proposed construction of bridges |
| | 2a | 3 | Roanoke River in vicinity of the Riverland neighborhood Blackwater River north of its crossing of Route 122, Smith River east of the community of Eagleston Falls | Negligible due to proposed construction of bridges |
| | 2b | 3 | Roanoke River at the current U.S. Route 220 crossing Blackwater River north of its crossing of Route 122, Smith River east of the community of Eagleston Falls | Negligible due to proposed construction of bridges |
| | 2c | 3 | Roanoke River at the current U.S. Route 220 crossing Blackwater River north of its crossing of Route 122, Smith River east of the community of Eagleston Falls | Negligible due to proposed construction of bridges |
| | 3 | 2 | Roanoke River at the current U.S. Route 220 crossing, Smith River north of the existing Route 682/Alternate Route 57 interchange with U.S. Route 220 | Negligible due to proposed construction of bridges |
| | 3a | 2 | Roanoke River at the current U.S. Route 220 crossing, Smith River north of the existing Route 682/Alternate Route 57 interchange with U.S. Route 220 | Negligible due to proposed construction of bridges |
| | 3b | 2 | Roanoke River at the current U.S. Route 220 crossing, Smith River north of the existing Route 682/Alternate Route 57 interchange with U.S. Route 220 | Negligible due to proposed construction of bridges |
| | 3c | 2 | Roanoke River at the current U.S. Route 220 crossing, Smith River north of the existing Route 682/Alternate Route 57 interchange with U.S. Route 220 | Negligible due to proposed construction of bridges |
| | 4 | 2 | Roanoke River in western Roanoke County south of Salem and east of Route 639, Smith River west of the existing Route 57 and Alternate Route 57 connector | Negligible due to proposed construction of bridges |
| | ALC | 3 | Roanoke River at US 220; Blackwater River north of its crossing of Route 122; Smith River east of Fishers Farm Park | Negligible due to proposed construction of bridges |

Mitigation

Construction of bridges will be phased to minimize effects to recreational boating interests. Stream channels will be restored to preconstruction configuration following removal of temporary causeways, coffer dams, and other construction materials. Construction encroachments “channelward” of the “ordinary water line” will be limited to structural supports (piles). Support structures will be spaced as to allow for the unimpeded passage of recreational watercraft once construction is complete.

Temporary effects associated with interstate construction would include construction of temporary causeways and coffer dams to accommodate bridge construction. Without adequate attention to recreation boating interests, bridge height, spacing of bridge support structures, and placement of fill to accommodate stream crossings could adversely affect navigability with respect to recreation boating opportunities during construction. Considering the limited size of recreational watercraft utilizing the navigable waters of the study

area (kayaks, canoes, and occasionally small motorcraft) and the availability of practicable mitigating measures, effects upon recreational boaters is considered to be minor and manageable.

#### 4.7.3.2 Wetlands

A large number of small anthropogenic (diked/impounded) palustrine habitats (almost exclusively farm ponds) are distributed throughout the study area, and a large number of stream crossings are involved under all alternatives. Locations and acreage of each wetland type (along with deepwater riverine and palustrine habitat) affected by the ALC are provided in Figures 4.7-5 through 4.7-14 and Table 4.7-6, respectively. Figures showing wetlands affected by previously considered alternatives are provided in the DEIS and the Natural Resources Technical Report (VDOT, 2000). Ponds that were formed through impoundment of ephemeral streams or excavation of uplands were determined to be non-jurisdictional from the perspective of Section 404 of the Clean Water Act and were, therefore, not included in the overall assessment of wetlands or waters of the U.S. Ephemeral streams are defined as streams that convey water only during brief periods following rain events and, because of their low volume, duration, and frequency of flow, do not exhibit an ordinary high water mark. Identification of ephemeral streams was accomplished by (1) performing field reconnaissance on a representative number of headwater stream systems to identify the relationship between ephemeral stream segments and their position in the landscape (i.e., their relationship to the headwaters), upstream drainage areas, and soil types, (2) developing a qualitative probability model based on observed relationships, and (3) applying this model to similar hydrogeomorphic settings within the study area.

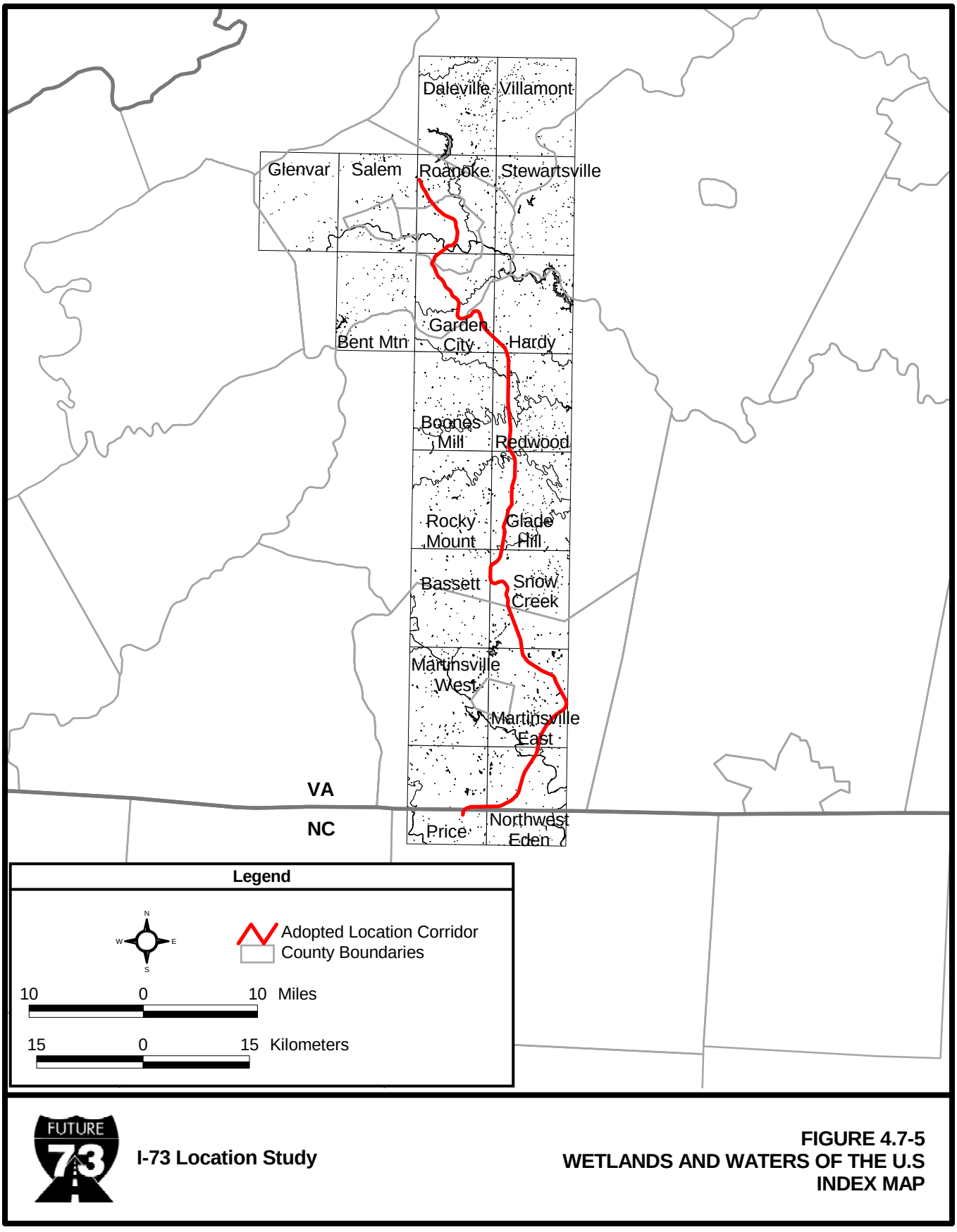
Although permanently flooded, diked/impounded, palustrine habitats with unconsolidated bottoms (PUBHh of FWS Classification [Cowardin, et al, 1979]) contribute significantly to the total area of NWI-mapped units affected under each option, these anthropogenic features are largely farm ponds comprised almost entirely of open water with very narrow fringes of emergent wetland vegetation being present. Because they are frequently situated in headwaters of streams, are effectively isolated from downstream areas by earthen berms, and support little emergent vegetation, these anthropogenic wetlands have relatively low functions and values as compared to other natural wetland types found within the study area. They do, however, provide limited value with respect to floodflow alteration, sediment/toxicant removal, and aquatic and wildlife diversity/abundance.

Forested palustrine wetlands (PFO1s of FWS Classification [Cowardin, et al, 1979]), scrub/shrub palustrine wetlands (PSS1s of FWS Classification), and emergent palustrine wetlands (PEM1s of FWS Classification), which occur along floodplains and lower reaches of perennial stream valleys throughout the study area, are considered to have relatively high functions and values. These high ratings are primarily due to their natural ability to contribute to flood control (especially along flood-prone streams like the Smith River), their ability to help protect water quality (especially important in streams like the Roanoke River, the Blackwater River, and the Smith River that serve as public water supplies), and their significant wildlife habitat attributes. Where associated with floodplains or other nearby wetland communities, these wetlands contribute significantly to all of the aforementioned public interests except uniqueness/heritage. A concerted effort was made during the preliminary engineering phase to avoid larger forested, scrub/shrub, and emergent wetland systems, especially those associated with floodplains.

Forested and scrub/shrub wetlands of the study area exhibit the highest level of functions and values identified in FWHA Technical Advisory T6640.8A (flood control capacity, shore line anchorage potential, water pollution abatement capacity, and fish and wildlife habitat value). Those alternatives resulting in the greatest loss of forested and scrub/shrub wetlands will result in the greatest relative severity of wetland impacts.

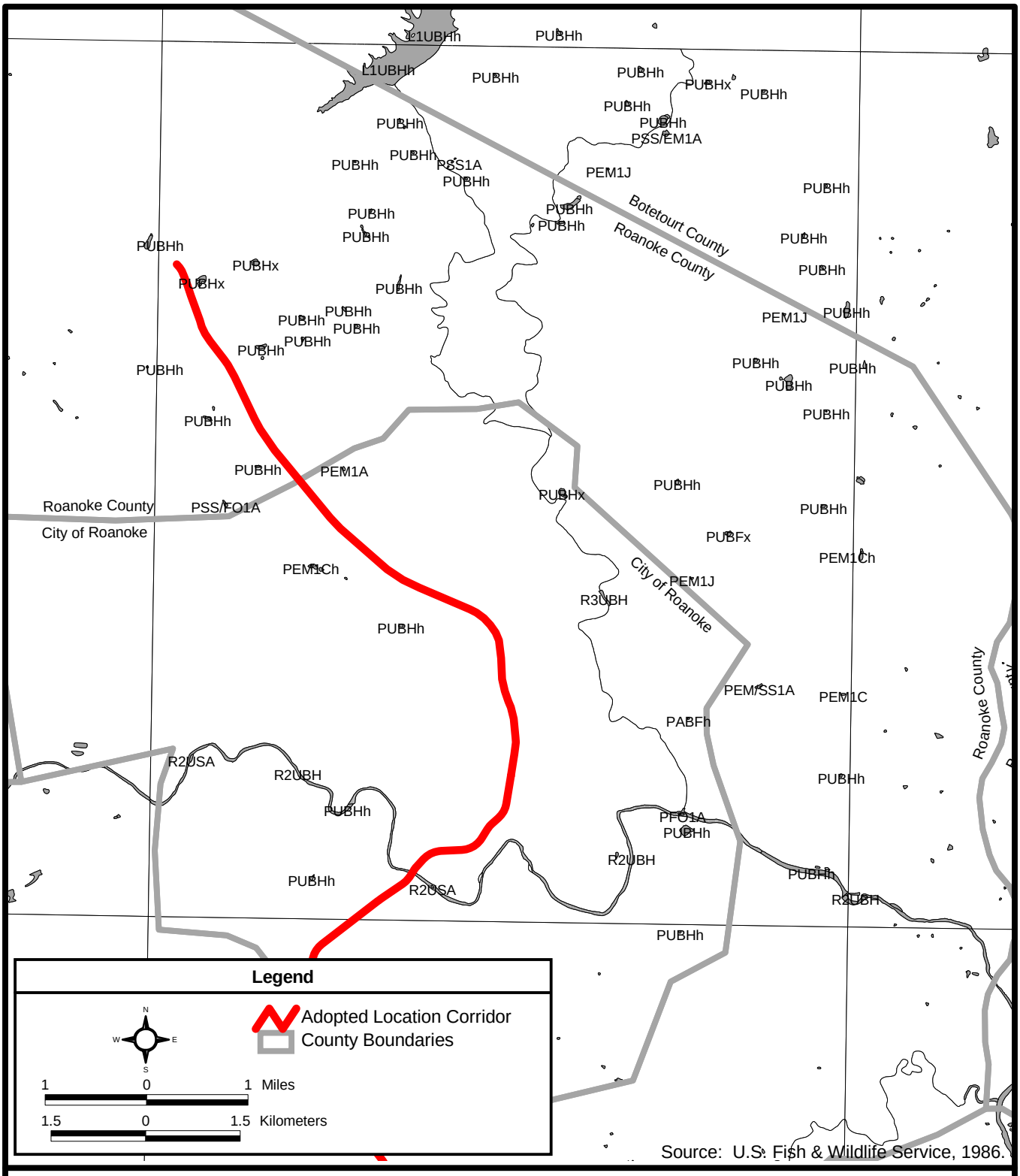
TSM Alternative

The TSM Alternative would result in encroachment within 0.9 acres (0.36 hectares) of riverine habitat and filling of 3.45 acres (1.40 hectares) of palustrine wetlands. This equates to 0.15 percent of the total area of riverine habitat and wetlands occurring within the 20 USGS 7.5-minute quadrangles comprising the study area. Specific types of wetlands affected are listed in Table 4.7-6. Wetland impacts associated with the TSM Alternative would be most severe with respect to scrub-shrub palustrine wetlands and impounded palustrine wetlands, at 0.3 percent and 0.2 percent of the regional total, respectively.



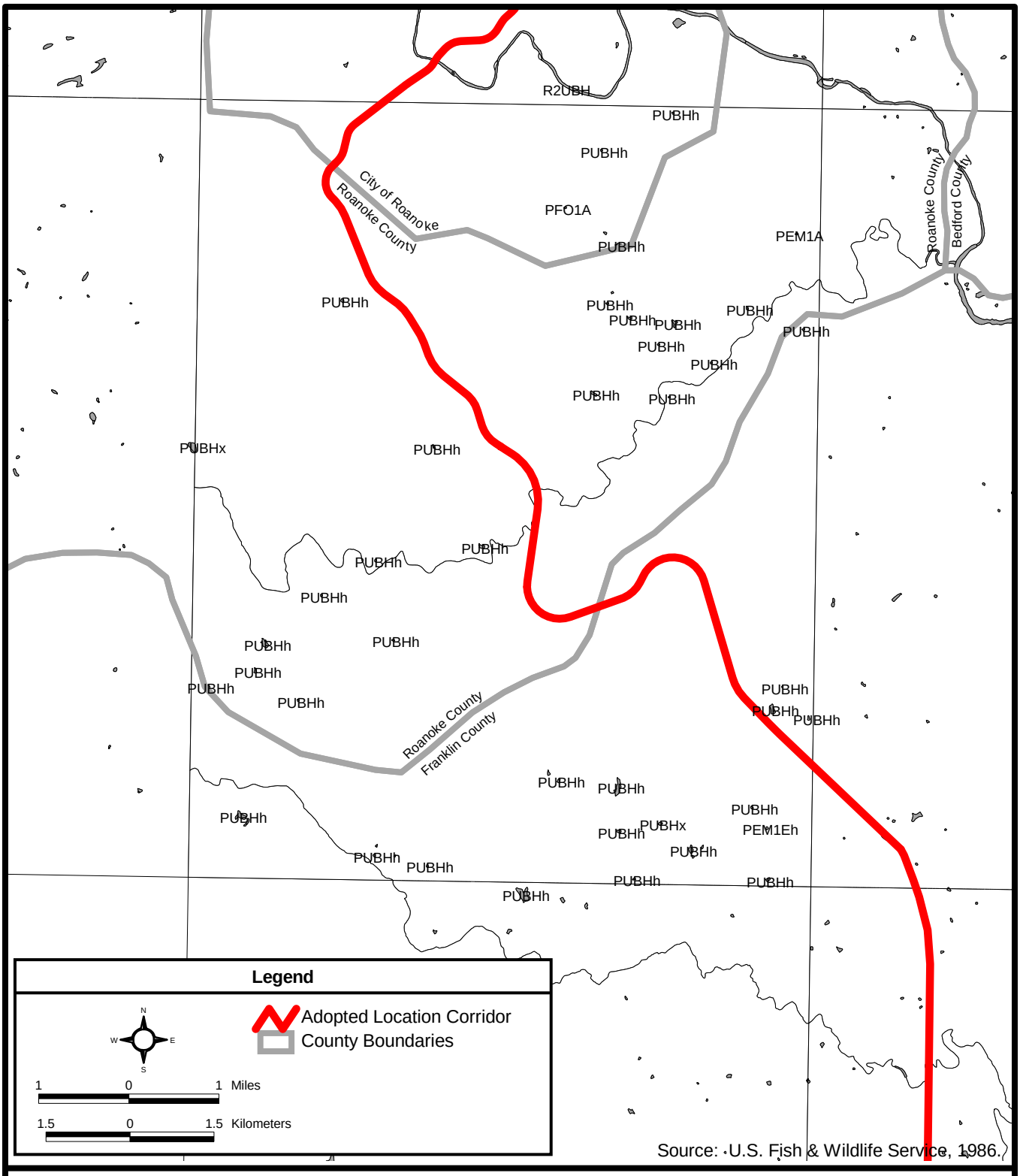

**I-73 Location Study**

**FIGURE 4.7-5**
**WETLANDS AND WATERS OF THE U.S**
**INDEX MAP**



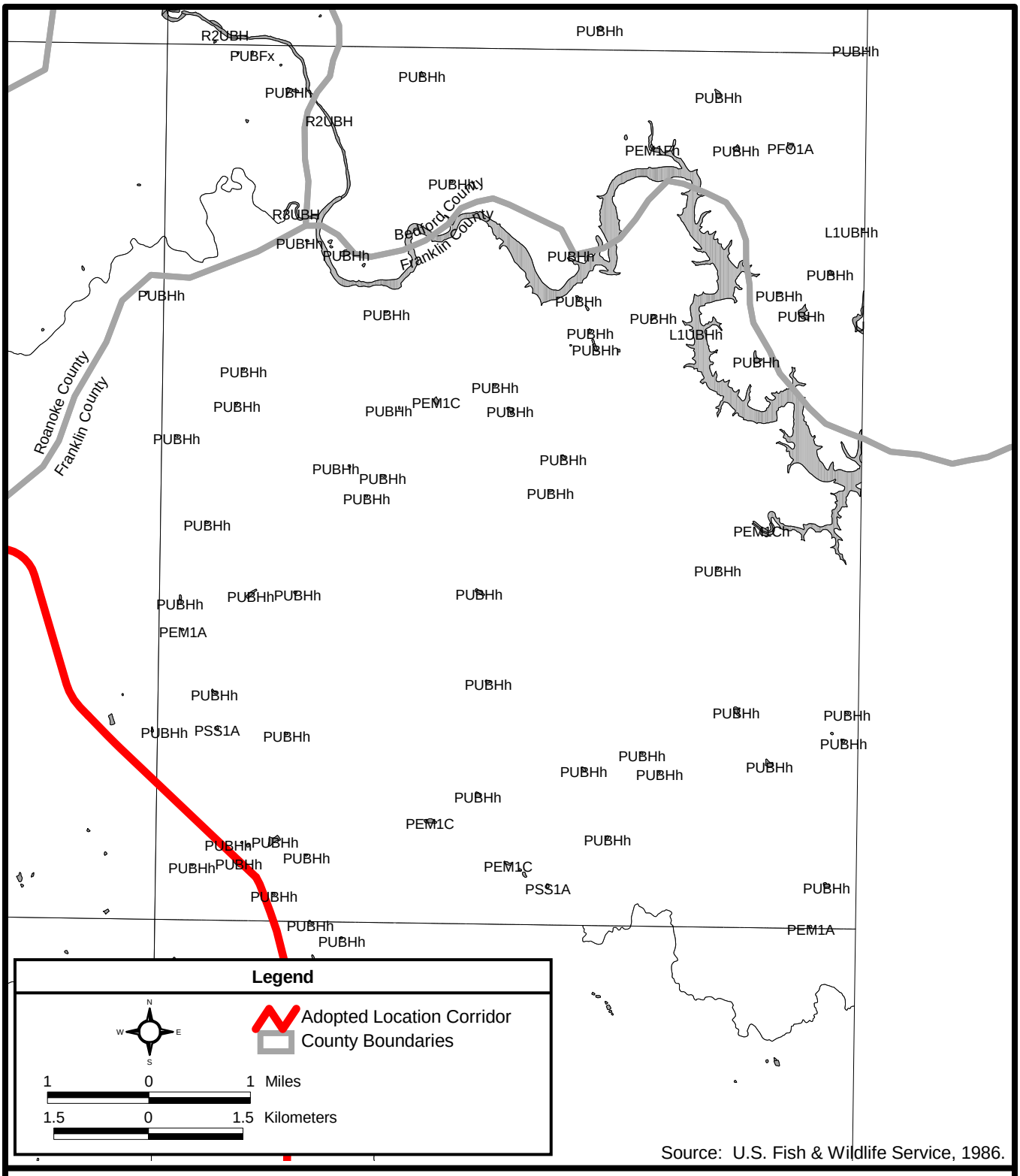

**I-73 Location Study**

**FIGURE 4.7-6**
**WETLANDS AND WATERS OF THE U.S.**
**ROANOKE QUADRANGLE**



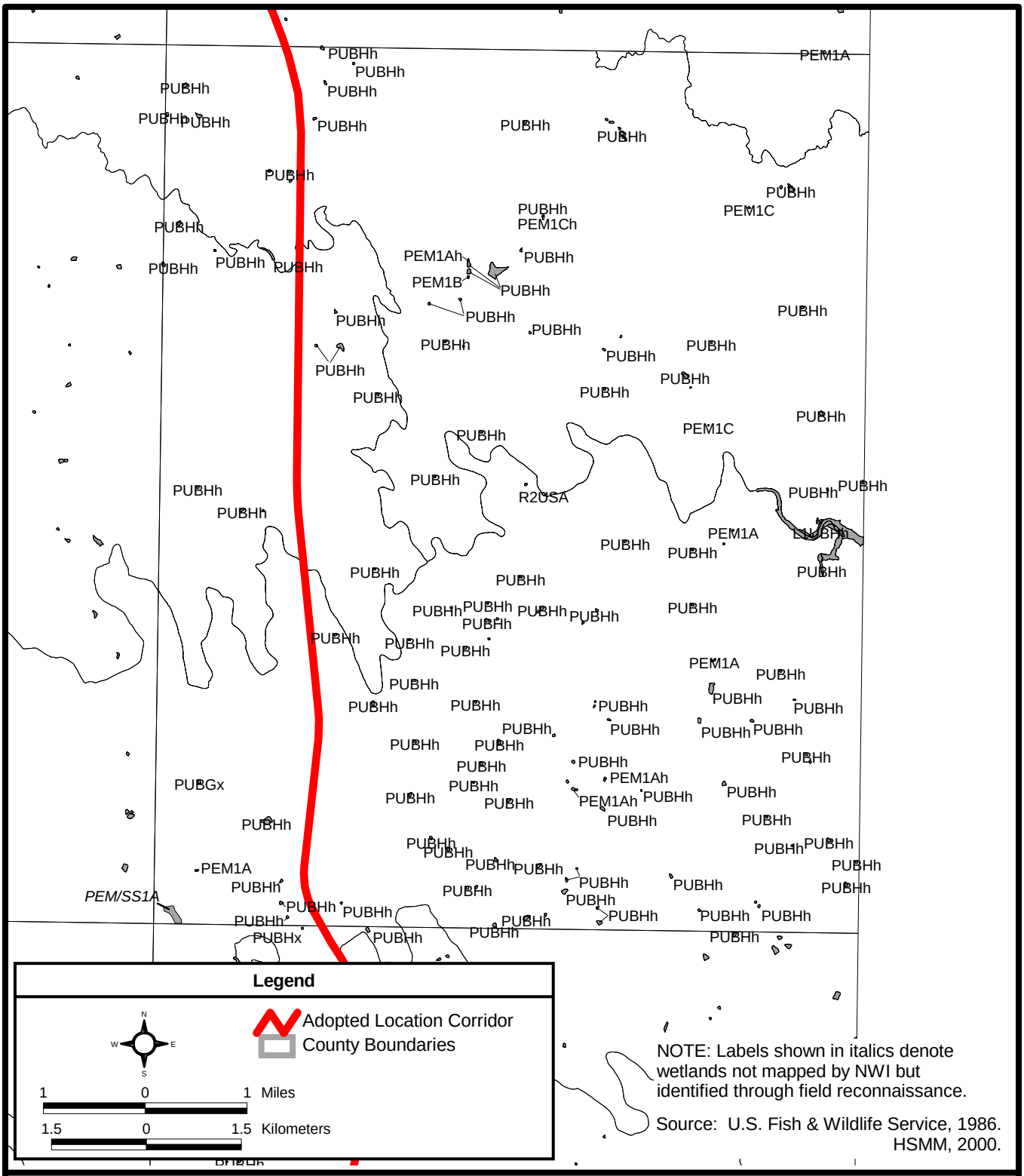

**I-73 Location Study**

**FIGURE 4.7-7**
**WETLANDS AND WATERS OF THE U.S.**
**GARDEN CITY QUADRANGLE**




**I-73 Location Study**

**FIGURE 4.7-8**
**WETLANDS AND WATERS OF THE U.S.**
**HARDY QUADRANGLE**

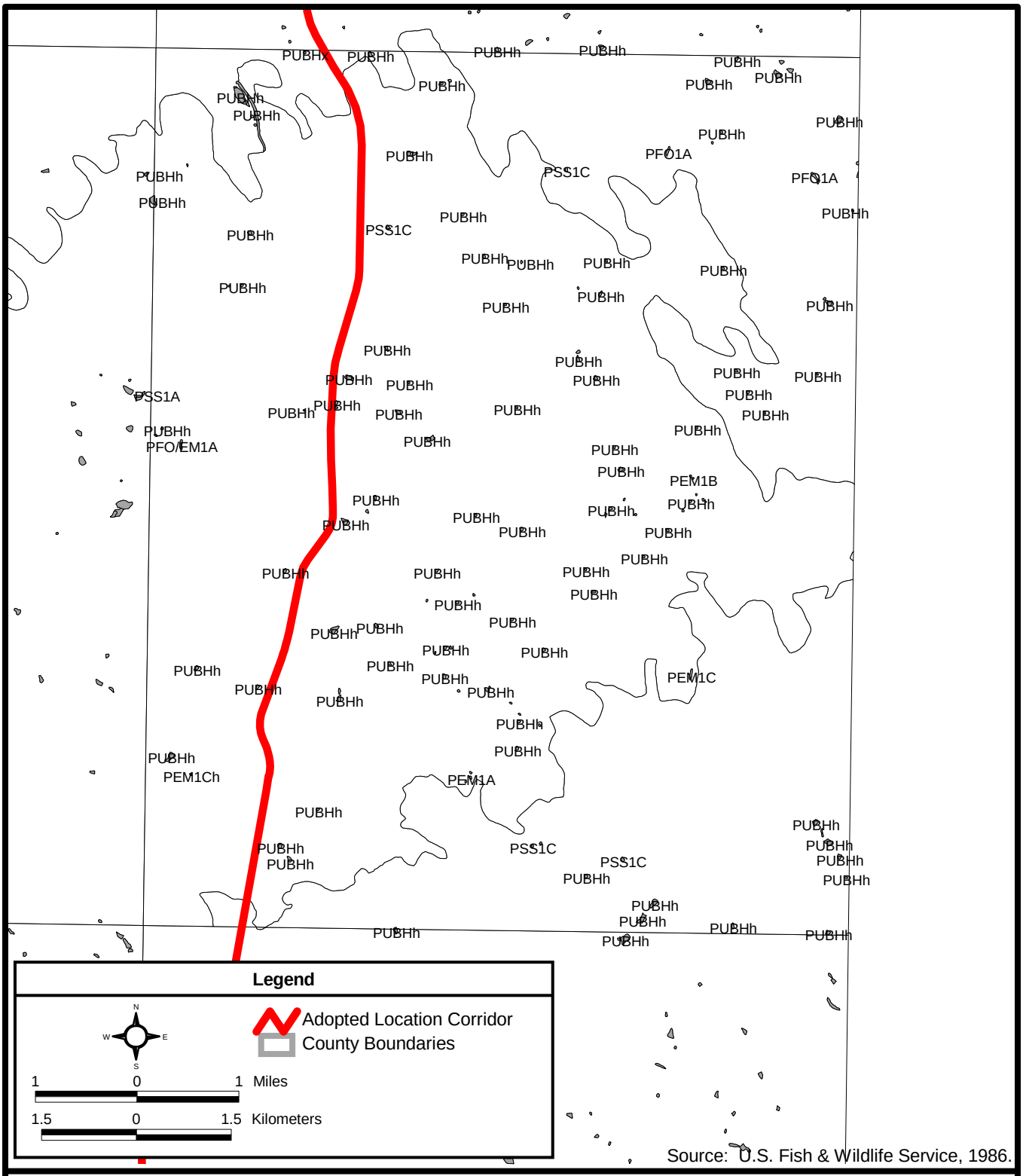



NOTE: Labels shown in italics denote wetlands not mapped by NWI but identified through field reconnaissance.

Source: U.S. Fish & Wildlife Service, 1986. HSMM, 2000.

I-73 Location Study

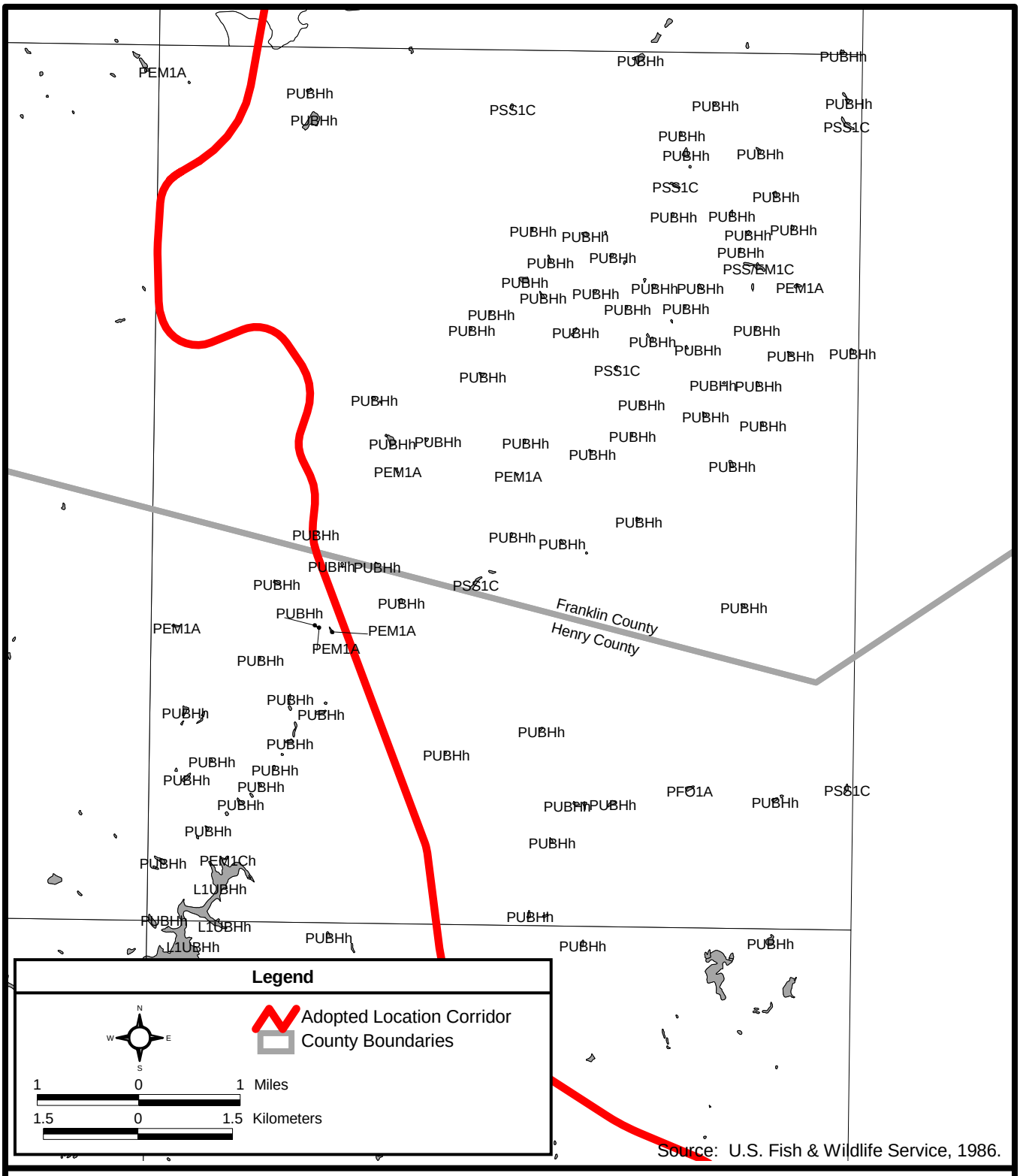
**FIGURE 4.7-9**
**WETLANDS AND WATERS OF THE U.S.**
**REDWOOD QUADRANGLE**




Source: U.S. Fish & Wildlife Service, 1986.

**I-73 Location Study**

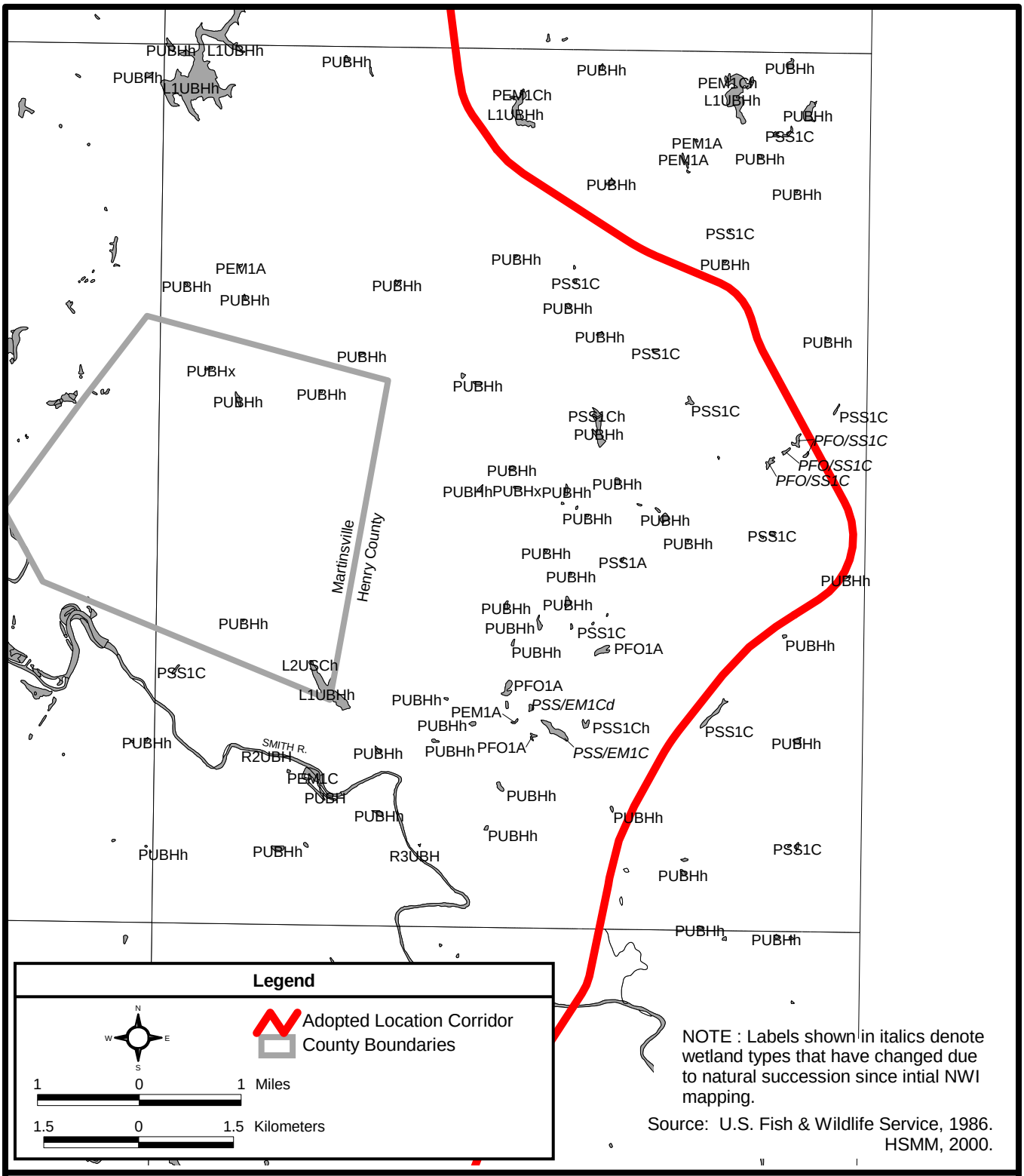
**FIGURE 4.7-10**
**WETLANDS AND WATERS OF THE U.S.**
**GLADE HILL QUADRANGLE**




Source: U.S. Fish & Wildlife Service, 1986.

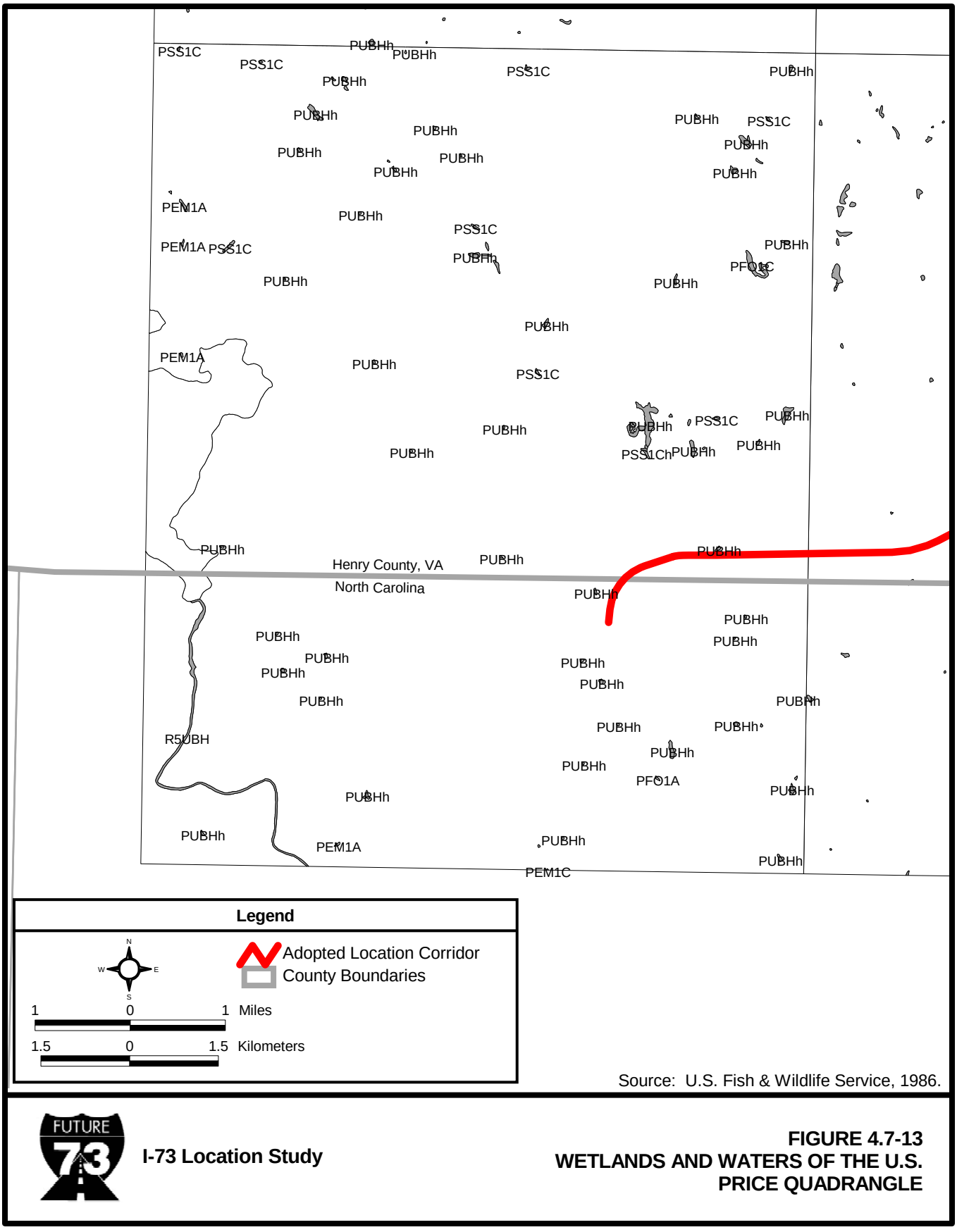
**I-73 Location Study**

**FIGURE 4.7-11**
**WETLANDS AND WATERS OF THE U.S.**
**SNOW CREEK QUADRANGLE**




**I-73 Location Study**

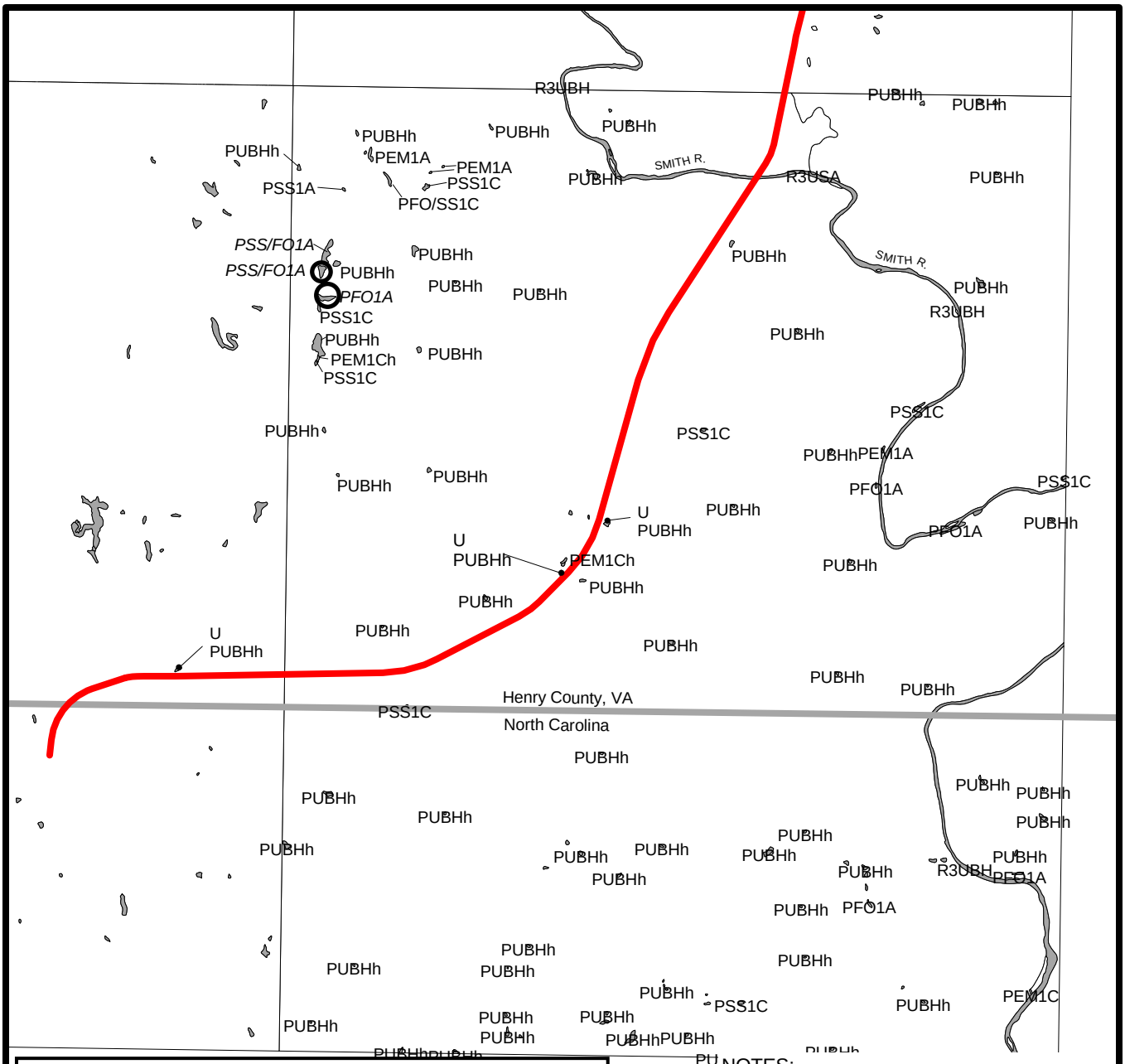
**FIGURE 4.7-12**
**WETLANDS AND WATERS OF THE U.S.**
**MARTINSVILLE EAST QUADRANGLE**




Source: U.S. Fish & Wildlife Service, 1986.

**I-73 Location Study**

**FIGURE 4.7-13**
**WETLANDS AND WATERS OF THE U.S.**
**PRICE QUADRANGLE**




**Legend**

Adopted Location Corridor
County Boundaries

1 0 1 Miles

1.5 0 1.5 Kilometers

NOTES:

1. Labels shown in italics denote wetland types that have changed due to natural succession since initial NWI mapping.
2. Wetlands that have been significantly altered since initial NWI mapping (filling, clearing, ditching) are circled.

Source: U.S. Fish & Wildlife Service, 1986.
HSMM, 2000.

**I-73 Location Study**

**FIGURE 4.7-14**
**WETLANDS AND WATERS OF THE U.S.**
**NORTHWEST EDEN QUADRANGLE**

**Table 4.7-6**
**IMPACTS TO WATERS OF THE U.S., INCLUDING WETLANDS**

| Alternative | | Resource Type [1] | Area Affected acres (hectares) | | Total Acreage Within Study Area acres (hectares) | | Percent of Total Affected |
|---|---|---|---|---|---|---|---|
| TSM | | R2/3UBH[3] | 0.9 | (0.36) | 931.27 | (376.88) | 0.1 |
| | | PUBHh [2] | 2.83 | (1.15) | 1,491.89 | (603.76) | 0.2 |
| | | PSS1C | 0.6 | (0.24) | 191.55 | (77.52) | 0.3 |
| | | PEM1A-C | 0.02 | (0.008) | 213.49 | (86.40) | 0.09 |
| | | TOTAL | 4.35 | (1.76) | 2,828.21 | (1,144.58) | 0.15 |
| Build Alternative Option (600-foot-wide assessment corridor) | 1 | R2/3UBH[3] | 2.0 | (0.8) | 931.27 | (376.88) | 0.2 |
| | | L1/2UBHh[3] | 4.2 | (1.7) | 1,485.39 | (601.13) | 0.3 |
| | | PUBHh [2] | 14.33 | (5.8) | 1,491.89 | (603.76) | 0.96 |
| | | PFO1A-C | 1.55 | (0.63) | 167.11 | (67.63) | 0.93 |
| | | PSS1C | 2.27 | (0.92) | 191.55 | (77.52) | 1.18 |
| | | PEM1A-C | 2.0 | (0.8) | 213.49 | (86.40) | 0.9 |
| | | TOTAL | 26.29 | (10.64) | 4,480.71 | (1,813.32) | 0.6 |
| | 1a | R2/3UBH[3] | 2.0 | (0.8) | 931.27 | (376.88) | 0.2 |
| | | L1/2UBHh[3] | 4.2 | (1.7) | 1,485.39 | (601.13) | 0.3 |
| | | PUBHh [2] | 14.08 | (5.6) | 1,491.89 | (603.76) | 0.94 |
| | | PFO1A-C | 1.65 | (0.67) | 167.11 | (67.63) | 0.99 |
| | | PSS1C | 2.02 | (0.82) | 191.55 | (77.52) | 1.0 |
| | | PEM1A-C | 1.73 | (0.7) | 213.49 | (86.40) | 0.8 |
| | | TOTAL | 25.62 | (10.37) | 4,480.71 | (1,813.32) | 0.57 |
| | 2 | R2/3UBH[3] | 9.14 | (3.7) | 931.27 | (376.88) | 1.0 |
| | | PUBHh [2] | 10.62 | (4.3) | 1,491.89 | (603.76) | 0.71 |
| | | PFO1A-C | 0.57 | (0.23) | 167.11 | (67.63) | 0.34 |
| | | PSS1C | 8.84 | (3.58) | 191.55 | (77.52) | 4.6 |
| | | PEM1A-C | 6.42 | (2.6) | 213.49 | (86.40) | 3.0 |
| | | TOTAL | 35.61 | (14.41) | 2,995.32 | (1,212.19) | 1.2 |
| | 2a | R2/3UBH[3] | 9.14 | (3.7) | 931.27 | (376.88) | 1.0 |
| | | PUBHh [2] | 10.62 | (4.3) | 1,491.89 | (603.76) | 0.71 |
| | | PFO1A-C | 0.57 | (0.23) | 167.11 | (67.63) | 0.34 |
| | | PSS1C | 8.84 | (3.58) | 191.55 | (77.52) | 4.6 |
| | | PEM1A-C | 6.42 | (2.6) | 213.49 | (86.40) | 3.0 |
| | | TOTAL | 35.61 | (14.41) | 2,995.32 | (1,212.19) | 1.2 |
| | 2b | R2/3UBH[3] | 2.2 | (0.9) | 931.27 | (376.88) | 0.2 |
| | | PUBHh [2] | 10.62 | (4.3) | 1,491.89 | (603.76) | 0.71 |
| | | PFO1A-C | 0.57 | (0.23) | 167.11 | (67.63) | 0.34 |
| | | PSS1C | 8.84 | (3.58) | 191.55 | (77.52) | 4.6 |
| | | PEM1A-C | 6.42 | (2.6) | 213.49 | (86.40) | 3.0 |
| | | TOTAL | 28.69 | (11.61) | 2,995.32 | (1,212.19) | 0.96 |
| | 2c | R2/3UBH[3] | 9.14 | (3.7) | 931.27 | (376.88) | 1.0 |
| | | PUBHh [2] | 8.9 | (3.6) | 1,491.89 | (603.76) | 0.6 |
| | | PFO1A-C | 0.57 | (0.23) | 167.11 | (67.63) | 0.34 |
| | | PSS1C | 8.84 | (3.58) | 191.55 | (77.52) | 4.6 |
| | | PEM1A-C | 6.42 | (2.6) | 213.49 | (86.40) | 3.0 |
| | | TOTAL | 33.88 | (13.71) | 2,995.32 | (1,212.19) | 1.1 |

[1] R2/3UBH (permanently flooded lower perennial and upper perennial riverine habitat with unconsolidated bottom); L1UBHh (impounded permanently flooded limnetic lacustrine habitat with unconsolidated bottom); PUBHh (diked or impounded permanently flooded palustrine habitat with unconsolidated bottom); PFO1A-C (temporarily to seasonally flooded broad-leaved deciduous forested palustrine wetland); PSS1C (seasonally flooded broad-leaved deciduous scrub/shrub palustrine wetland); PEM1A-C (temporarily to seasonally flooded persistent emergent palustrine wetland).

[2] Does not include ponds formed through impoundment of ephemeral streams or excavation of uplands.

[3] It should be noted that acreage listed under riverine habitat (R2/3UBH) and lacustrine habitat (L1UBHh) is not intended to imply a loss of these resources to the extents listed.

[4] PFO1 and PSS1 amounts adjusted on all Options 1 Options 2 and ALC to reflect fact that PSS1 along segment 373 is now 25% PFO1 and 75% PSS1 due to natural succession.

**TABLE 4.7-6 (CONTINUED)**
**IMPACTS TO WATERS OF THE U.S., INCLUDING WETLANDS**

| Alternative | | Resource Type [1] | Area Affected acres (hectares) | | Total Acreage Within Study Area acres (hectares) | | Percent of Total Affected |
|---|---|---|---|---|---|---|---|
| Build Alternative Option (600-foot-wide assessment corridor) | 3 | R2/3UBH[3] | 2.72 | (1.1) | 931.27 | (376.88) | 0.3 |
| | | PUBHh [2] | 7.49 | (3.03) | 1,491.89 | (603.76) | 0.5 |
| | | PFO1A-C | 1.24 | (0.505) | 167.11 | (67.63) | 0.7 |
| | | PSS1C | 1.49 | (0.602) | 191.55 | (77.52) | 0.8 |
| | | PEM1A-C | 1.93 | (0.78) | 213.49 | (86.40) | 0.9 |
| | | TOTAL | 14.85 | (6.01) | 2,995.32 | (1,212.19) | 0.5 |
| | 3a | R2/3UBH[3] | 2.72 | (1.1) | 931.27 | (376.88) | 0.3 |
| | | PUBHh [2] | 7.49 | (3.03) | 1,491.89 | (603.76) | 0.5 |
| | | PFO1A-C | 1.24 | (0.502) | 167.11 | (67.63) | 0.7 |
| | | PSS1C | 1.49 | (0.602) | 191.55 | (77.52) | 0.8 |
| | | PEM1A-C | 1.93 | (0.78) | 213.49 | (86.40) | 0.9 |
| | | TOTAL | 14.85 | (6.01) | 2,995.32 | (1,212.19) | 0.5 |
| | 3b | R2/3UBH[3] | 2.72 | (1.1) | 931.27 | (376.88) | 0.3 |
| | | PUBHh [2] | 3.03 | (7.49) | 1,491.89 | (603.76) | 0.5 |
| | | PFO1A-C | 1.24 | (0.502) | 167.11 | (67.63) | 0.7 |
| | | PSS1C | 1.49 | (0.602) | 191.55 | (77.52) | 0.8 |
| | | PEM1A-C | 1.93 | (0.78) | 213.49 | (86.40) | 0.9 |
| | | TOTAL | 14.85 | (6.01) | 2,995.32 | (1,212.19) | 0.5 |
| | 3c | R2/3UBH[3] | 2.72 | (1.1) | 931.27 | (376.88) | 0.3 |
| | | PUBHh [2] | 4.45 | (1.8) | 1,491.89 | (603.76) | 0.3 |
| | | PFO1A-C | 1.42 | (0.502) | 167.11 | (67.63) | 0.7 |
| | | PSS1C | 1.49 | (0.602) | 191.55 | (77.52) | 0.8 |
| | | PEM1A-C | 1.95 | (0.79) | 213.49 | (86.40) | 0.9 |
| | | TOTAL | 11.84 | (4.79) | 2,995.32 | (1,212.19) | 0.4 |
| | 4 | R2/3UBH[3] | 7.91 | (3.2) | 931.27 | (376.88) | 0.8 |
| | | PUBHh [2] | 4.37 | (1.77) | 1,491.89 | (603.76) | 0.29 |
| | | PFO1A-C | 0.07 | (0.03) | 167.11 | (67.63) | 0.04 |
| | | PSS1C | 5.44 | (2.2) | 191.55 | (77.52) | 2.8 |
| | | PEM1A-C | 3.21 | (1.3) | 213.49 | (86.40) | 1.5 |
| | | TOTAL | 21.00 | (8.5) | 2,995.32 | (1,212.19) | 0.7 |
| | ALC | R2/3UBH[3] | 2.20 | (1.00) | 931.27 | (376.88) | 0.24 |
| | | L1/2UBHh[3] | 0.00 | (0.00) | 1,485.39 | (601.13) | 0.00 |
| | | PUBHh [2] | 9.40 | (3.80) | 1,491.89 | (603.76) | 0.63 |
| | | PFO1A-C | 0.00 | (0.00) | 167.11 | (67.63) | 0.00 |
| | | PSS1C | 2.50 | (1.00) | 191.55 | (77.52) | 1.31 |
| | | PEM1A-C | 1.70 | (0.70) | 213.49 | (86.40) | 0.80 |
| | | TOTAL | 21.30 | (8.60) | 2,995.32 | (1,212.19) | 0.7 |

[1] R2/3UBH (permanently flooded lower perennial and upper perennial riverine habitat with unconsolidated bottom); L1UBHh (impounded permanently flooded limnetic lacustrine habitat with unconsolidated bottom); PUBHh (diked or impounded permanently flooded palustrine habitat with unconsolidated bottom); PFO1A-C (temporarily to seasonally flooded broad-leaved deciduous forested palustrine wetland); PSS1C (seasonally flooded broad-leaved deciduous scrub/shrub palustrine wetland); PEM1A-C(temporarily to seasonally flooded persistent emergent palustrine wetland)

[2] Does not include ponds formed through impoundment of ephemeral streams or excavation of uplands.

[3] It should be noted that acreage listed under riverine habitat (R2/3UBH) and lacustrine habitat (L1UBHh) is intended to convey an affect (such as shading) but is not intended to imply a loss of these resources to the extents listed.

Build Alternative

Wetland impacts for the Build Alternative were assessed using a 600-foot-wide study corridor. Limits of construction will not extend outside this study corridor; therefore, values reported reflect maximum anticipated impacts and are likely overstated. In addition, the 600 foot wide study corridor will allow designers to shift the alignment during final design to further minimize wetland impacts. As listed in Table 4.7-6, Option 3c would

entail the smallest area of effects to waters of the U.S. (including wetlands) with 11.84 acres (4.79 hectares). This equates to 0.4 percent of the total area of riverine habitat and wetlands occurring within the 20 USGS 7.5-minute quadrangles comprising the study area. Option 2 and Option 2a would entail the greatest area of effects to waters of the U.S. (including wetlands) with 35.61 acres (14.41 hectares). This equates to 1.2 percent of the total area of riverine habitat and wetlands occurring within the 20 USGS 7.5-minute quadrangles comprising the study area. The ALC would affect 21.3 acres (8.60 hectares) of waters of the U.S. (including wetlands). This equates to 0.7 percent of the total area of riverine habitat and wetlands occurring within the 20 USGS 7.5-minute quadrangles comprising the study area.

Community-specific wetland impacts would be most severe under Build Alternative Options 2, 2a, 2b, and 2c where 4.9 percent of the regional total of scrub/shrub palustrine wetlands would be affected. These scrub/shrub wetlands have relatively high functions and values (especially compared to the impounded or excavated palustrine wetlands of the study) and are located within flood-prone portions of the Smith River watershed. The relatively high functions and values of these scrub/shrub wetlands (most notably, their importance to flood storage and peak flow attenuation, and their association with riparian wildlife corridors) combined with the percent that would be affected on a regional basis under Build Alternative Options 2, 2a, and 2b constitute the single-most severe impact to wetlands identified under this study.

Primary effects to wetlands resulting from new interstate construction would include discharges of dredged or fill material for culverted stream crossings, bridge abutments, and stream relocations. Secondary effects would include discharges of stormwater from areas draining the roadway and right-of-way, shading at bridge crossings, and increase noise levels that may cause certain species of mobile wildlife to avoid areas immediately adjoining the interstate.

Mitigation

As previously discussed, a large number of small anthropogenic (diked/impounded) palustrine habitats (almost exclusively farm ponds) are distributed throughout the study area and a large number of stream crossings are involved under all alternatives. Because of this spatial distribution of palustrine habitat and wetlands and the need to comply with design speed geometrics dictated by FHWA and AASHTO standards, no practicable wetland avoidance build alternatives were identified at this stage of assessment. The No-Build would, however, serve as a wetlands avoidance alternative. In addition, the 600 foot wide study corridor will allow designers to shift the alignment during final design to further minimize wetland impacts.

During the preliminary engineering phase, a concerted effort was made to avoid or minimize impacts to forested, scrub/shrub, and emergent wetland systems - especially those associated with floodplains and flood-prone areas. Avoidance and minimization efforts have been applied to the alternatives analysis for floodplain wetlands (due to the need to cross major stream crossings on new alignment or the need to substantially upgrade existing crossings). Alignments were located to cross floodplain systems at their narrowest points where practicable, thereby minimizing unavoidable effects. This effort is reflected in the relatively small areas of encroachment listed in Table 4.7-6. All practicable measures to minimize wetland impacts will be further considered and implemented during design of the selected alternative - especially with respect to forested and scrub/shrub wetlands. Unavoidable impacts associated with the selected alternative will be minimized to the fullest degree practicable and appropriate compensation provided.

Using conventionally prescribed mitigation ratios of 2:1 for forested wetlands, 1.5:1 for scrub/shrub wetlands, and 1:1 for emergent wetlands, it has been determined that a total of 5.45 acres of wetlands compensation will be required to mitigate impacts associated with the ALC (Table 4.7-7). In-place (i.e., within the same watershed), in-kind (i.e., wetland type for wetland type) mitigation at the prescribed ratios would be the intended means for wetlands mitigation, where feasible. Because wetlands restoration is considered to be the preferred means for mitigating wetland impacts, special effort will be given to locating and restoring prior-converted wetlands. The diked/impounded palustrine habitat listed as PUBHh's in Table 4.7-6 are farm ponds and other man-made open-water features. Because of their man-made origin and relatively low functions and values, no mitigation measures have been proposed specifically for these PUBHh's; however, certain functions associated with these PUBHh's would be replaced at enhanced levels through the inclusion of extended wet detention basins as part of the proposed stormwater management system. Should restoration

of prior-converted croplands or farmed wetlands prove infeasible (in whole or in part), other mitigation measures such as wetlands compensation (construction of man-made wetlands), preservation of existing wetlands, and payment-in-lieu into the Virginia Wetlands Restoration Trust Fund also remain as viable options.

**Table 4.7-7**
**WETLAND MITIGATION REQUIRMENTS: ADOPTED LOCATION CORRIDOR (ALC)**

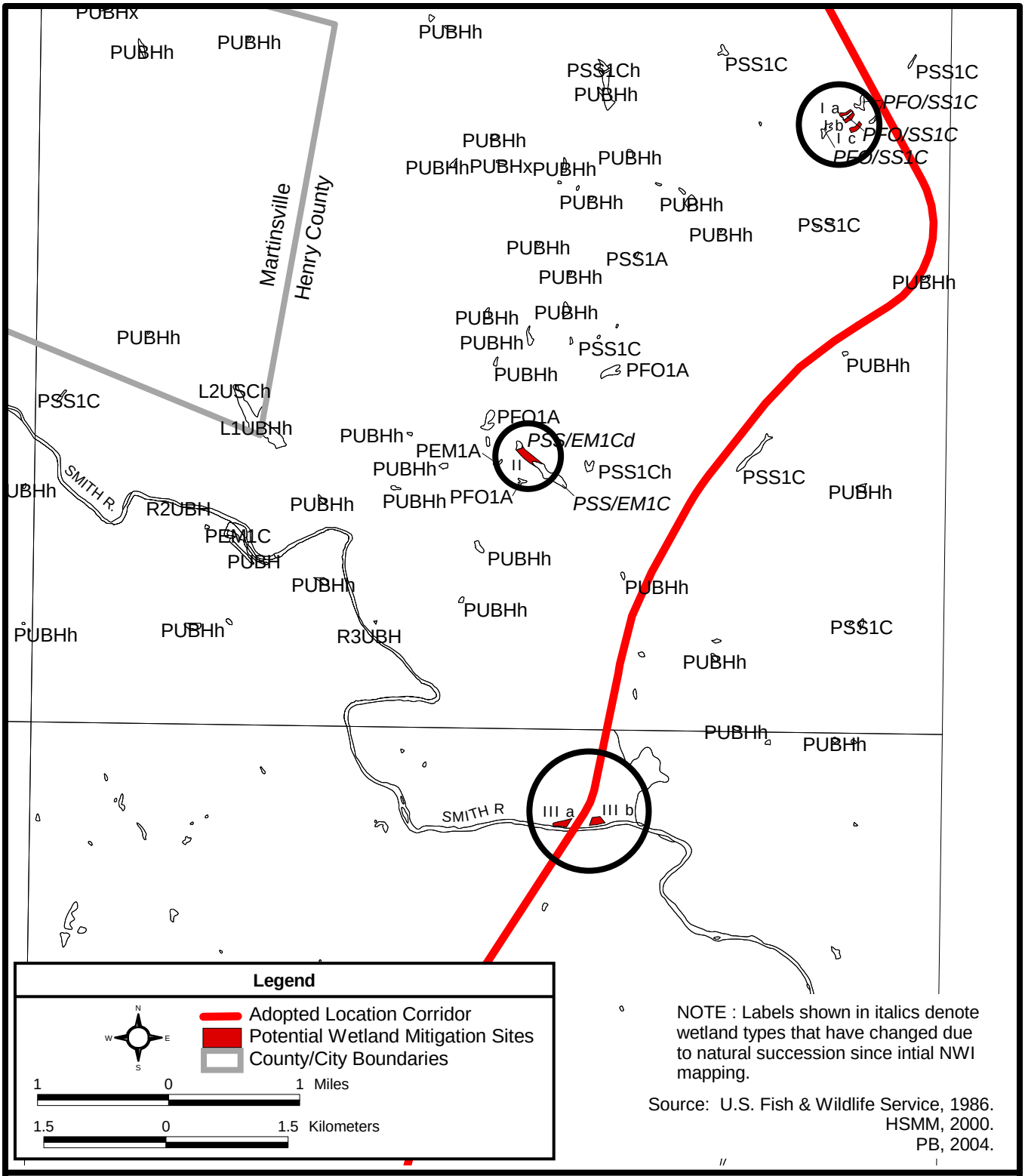
| Wetland Type [1] | Area Affected acres (hectares) | | Waterway (Watershed) Affected | Prescribed Mitigation Ratio | Mitigation Required acres (hectares | |
|---|---|---|---|---|---|---|
| PFO1A-C | 0.00 | (0.00) | Leatherwood Creek (Roanoke River: Upper Dan Subbasin) | 2:1 | 0.00 | (0.00) |
| PSS1C | 2.50 | (1.00) | Leatherwood Creek; Beaver Creek (Roanoke River: Upper Dan Subbasin) | 1.5:1 | 3.75 | (1.50) |
| PEM1A-C | 1.70 | (0.70) | Beaver Creek; Toeclout Branch (Roanoke River: Upper Dan Subbasin) | 1:1 | 1.70 | (0.70) |
| TOTAL | 4.2 | (1.71) | Not Applicable | Not Applicable | 5.45 | 2.20 |

[1] PFO1A-C (temporarily to seasonally flooded broad-leaved deciduous forested palustrine wetland); PSS1C (seasonally flooded broad-leaved deciduous scrub/shrub palustrine wetland); PEM1A-C (temporarily to seasonally flooded persistent emergent palustrine wetland)

No operational wetland mitigation banks currently exist within the study area or nearby portions of affected watersheds (U.S. Army Corps of Engineers, Norfolk District, 12 November 2002). Review of maps on file with the NRCS and personal communications with NRCS personnel confirm that no prior-converted croplands or farmed wetlands are located within the I-73 study area or adjoining portions of Roanoke, Franklin, and Henry counties (USDA, NRSC, 19 December 2002 personal communication). Restoration of prior-converted croplands or farmed wetlands outside the project region will be considered only if opportunities for other types of wetlands mitigation within the region are determined to be imprudent or infeasible. Several riparian areas exist within the Upper Dan River Subbasin in the vicinity of the ALC within which compensatory wetlands could be constructed (Figure 4.7-15). These areas consist of:

- approximately 4.8 acres of old field and agricultural lands (alfalfa crops) along Leatherwood Creek just upstream of Route 648 in central Henry County;
- approximately 4.1 acres of pastureland along Leatherwood Creek just downstream of Route 620 in southwestern Henry County;
- approximately 3.0 acres of old field and pastureland along the northern banks of the Smith River due west of its confluence with Leatherwood Creek in southwestern Henry County.

These prospective compensatory wetland sites are located within low-lying and gently sloping terraces within the floodplains of the waterways. Creation of compensatory wetlands would be accomplished by (1) excavating to ground elevations conducive to the establishment of wetlands hydrology, (2) routing surface drainage (including roadway drainage if necessary) to provide a hydrologic system that is dependent on both groundwater and surface water sources, and (3) planting hydrophytic vegetation native to the area. Establishment of a heterogeneous wetland community reflecting relative proportions of the various wetland types affected (see Table 4.7-7) would be the primary goal.




**I-73 Location Study**

**FIGURE 4.7-15**
**POTENTIAL WETLAND MITIGATION SITES**

### 4.7.4 100-Year Floodplains

Floodplains are recognized as providing a variety of ecological and societal functions and benefits. Floodplains mitigate the flow of floods, provide flood storage, help protect water quality, and provide habitat for flora and fauna. Historic and archaeological resources along with recreational sites are often found within floodplains. The protection of floodplains and associated floodways is mandated under Executive Order 11988 (Floodplain Management), USDOT Regulation 23 CFR 650 Subpart A (Location Hydraulics Studies),and USDOT Order 5650.2 (Floodplain Management and Protection). The purpose of these program documents is to ensure that federal highways projects avoid or minimize floodplain encroachments to the fullest degree practicable and that the projects do not encourage secondary land use development in areas where such development would be incompatible with floodplain management. Where floodplain encroachments are unavoidable, federal regulations require that appropriate measures be employed to mitigate effects. U.S. Water Resources Council Floodplain Management Guidelines for Implementing Executive Order 11988 states that regulatory floodways must be reserved in an open manner (i.e., unconfined or unobstructed either horizontally or vertically) to provide for the discharge of the base flood so the cumulative increase in water surface elevation is no more than one foot, as set by the NFIP.

Waterways contained within 100-year floodplains of the study area are shown on Figures 4.7-16 through 4.7-18 and are listed in Table 4.7-8. Figures showing floodplains affected by previously considered alternatives are provided in the DEIS and the Natural Resources Technical Report (VDOT, 2000). The following potentially affected waterways contain designated regulated floodways as well: the Roanoke River in Roanoke County and Bedford County; Back Creek, Lick Run, Murray Branch, and Ore Branch in Roanoke County; the Blackwater River, the Pigg River, Maggodee Creek, and Gills Creek in Franklin County; and the Smith River, Leatherwood Creek, Marrowbone Creek, Grassy Creek, Jordan Creek, Beaver Creek, Reed Creek, and Little Reed Creek in Henry County.

#### 4.7.4.1 TSM Alternative

Implementation of the various components comprising the TSM Alternative would encroach upon the 100-year floodplain of affected waterways at seven locations. The TSM Alternative would entail the crossing regulated floodways at four locations (Table 4.7-8).

#### 4.7.4.2 Build Alternative

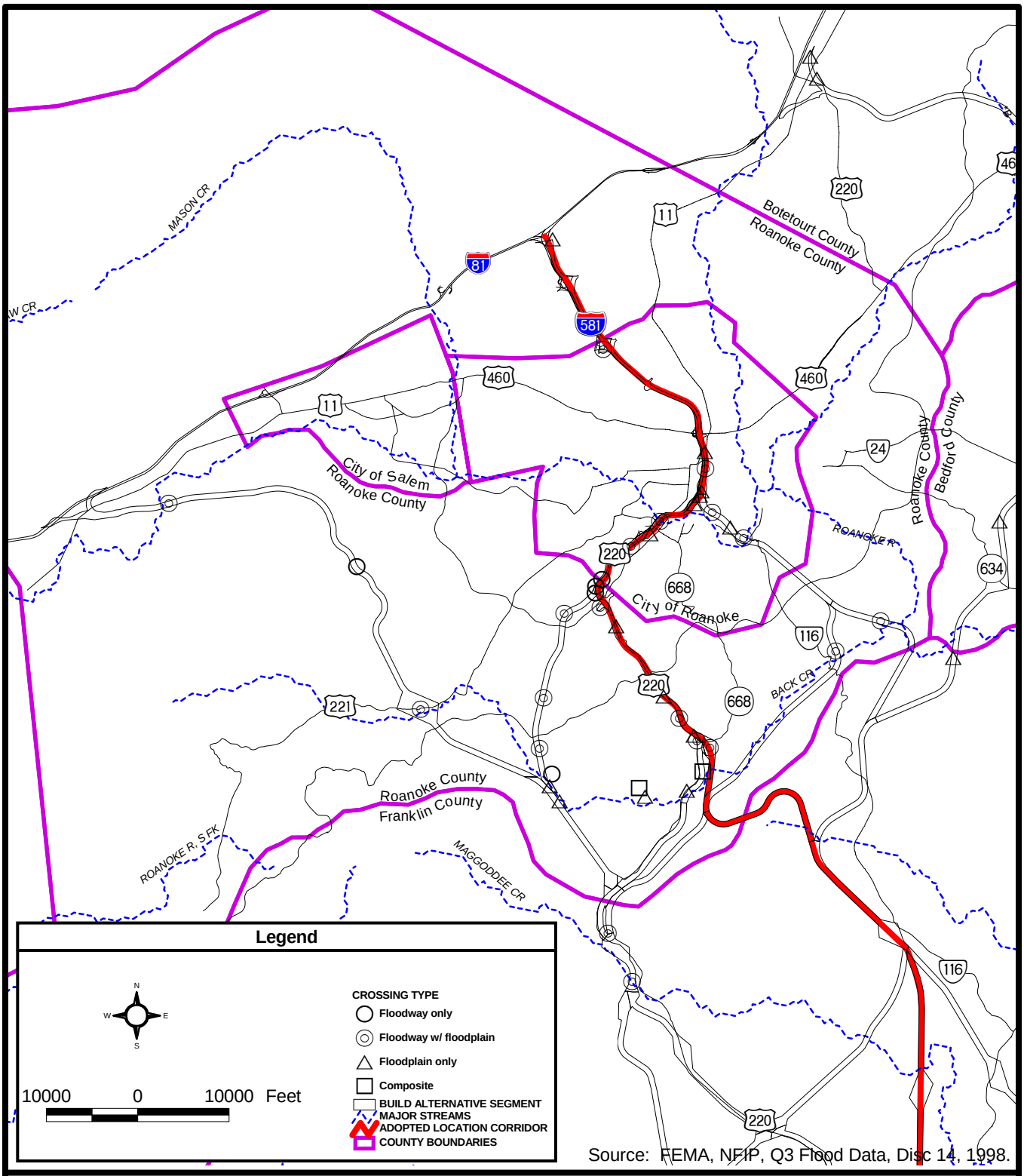
Construction of any of the options comprising the Build Alternative will result in the unavoidable encroachment within 100-year floodplains and the crossing of regulated floodways along a number of streams within the study area (Table 4.7-8). Streams will be bridged, culverted, or relocated according to site-specific conditions. All intermittent streams, all small-sized perennial streams, and some medium-sized perennial streams will be either bridged or culverted or, in some cases, relocated.

Placement of fill material for culverted stream crossings and bridge abutments and the placement of bridge support structures have the potential to cause an incremental loss of flood storage within the 100-year floodplain; however, the structures will be sized and spaced to avoid unacceptable increases to 100-year flood levels (i.e., increases greater than one foot (0.3048 meter)). Historical records indicate that the areas having the greatest risk of flood damage within the study area are along the Roanoke River, Lick Run, and Back Creek in and near the city of Roanoke and along the Smith River in and near the city of Martinsville. Historical information related to flood risks is discussed in Section 3.7.8.

Within the study area, floodplain effects are most fully realized in locations where proposed highway alignments parallel and encroach longitudinally upon a floodplain for a significant distance. This is especially true of Lick Run (under Options 2, 2a, 2b, 2c, 3, 3a, 3b, 3c, and the ALC), Ore Branch (under Options 3, 3a, 3b, and 3c), Grassy Creek (under Options 3, 3a, 3b, and 3c), and Little Reed Creek (under Options 3, 3a, 3b, and 3c). Bank-to-bank crossings of major floodplains, such as those along the Roanoke River and Smith River, also contribute to significant floodplain encroachments in terms of the total number of encroachments; Options 2b, 3a, and the ALC would entail the greatest number of potential floodplain encroachments (at 28 encroachments each). The relatively large number of potential encroachments associated with these options

is largely attributed to parallel encroachments along Lick Branch, Ore Branch, Grassy Creek, and Little Reed Creek. These encroachments occur in limited or confined areas. Such as existing urban alignments (I-581, U.S. 220/Roy Weber Freeway and U.S. 220/Martinsville Bypass) or in confined mountain passes where the proposed alignment shares a parallel drainage shed. Alternatives in these areas are limited and would require extensive earthwork and higher construction costs. Option 4, with 18 potential floodplain encroachments, entails the least number of encroachments.

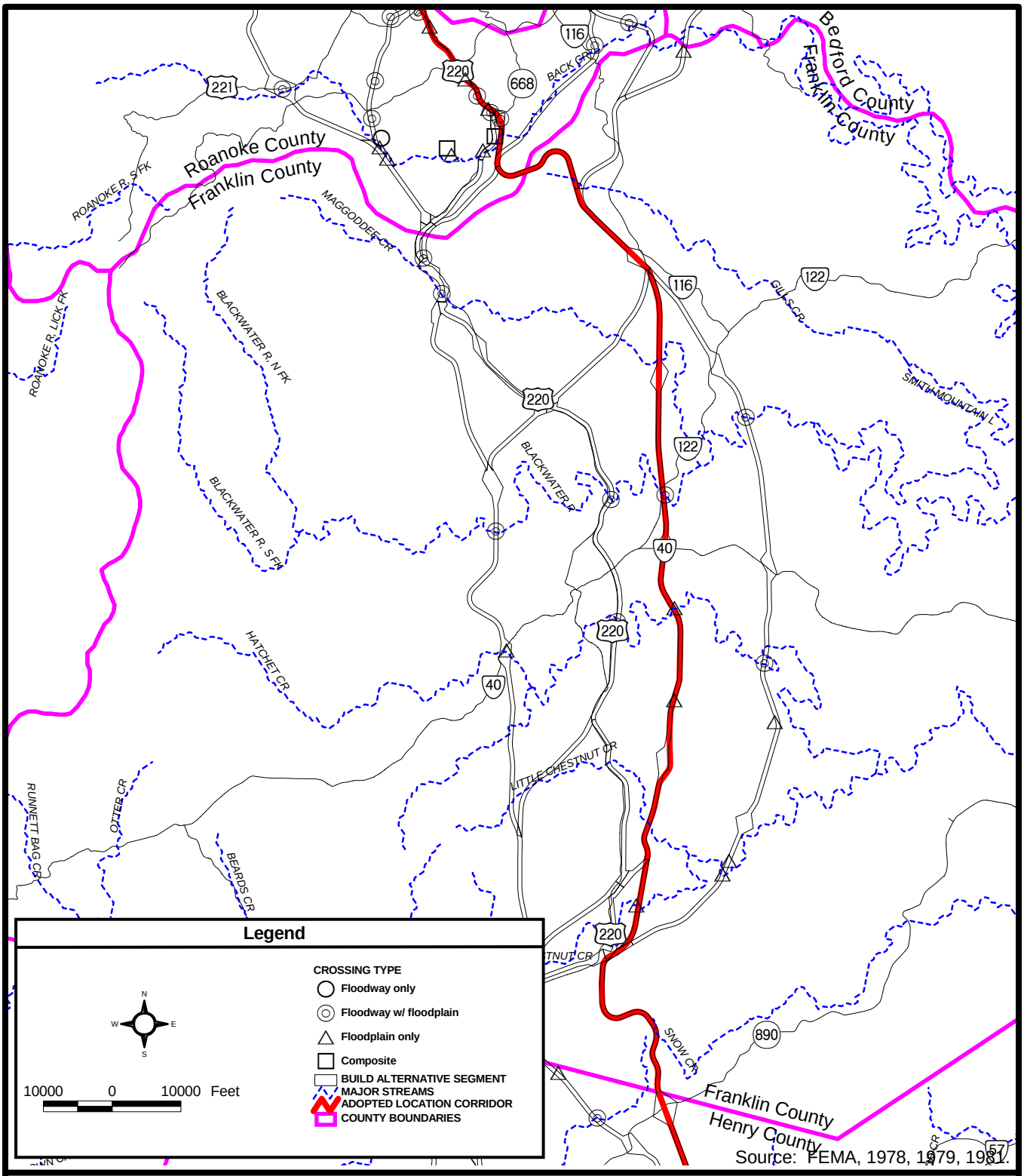
(This area left blank intentionally)




FUTURE 73

**I-73 Location Study**

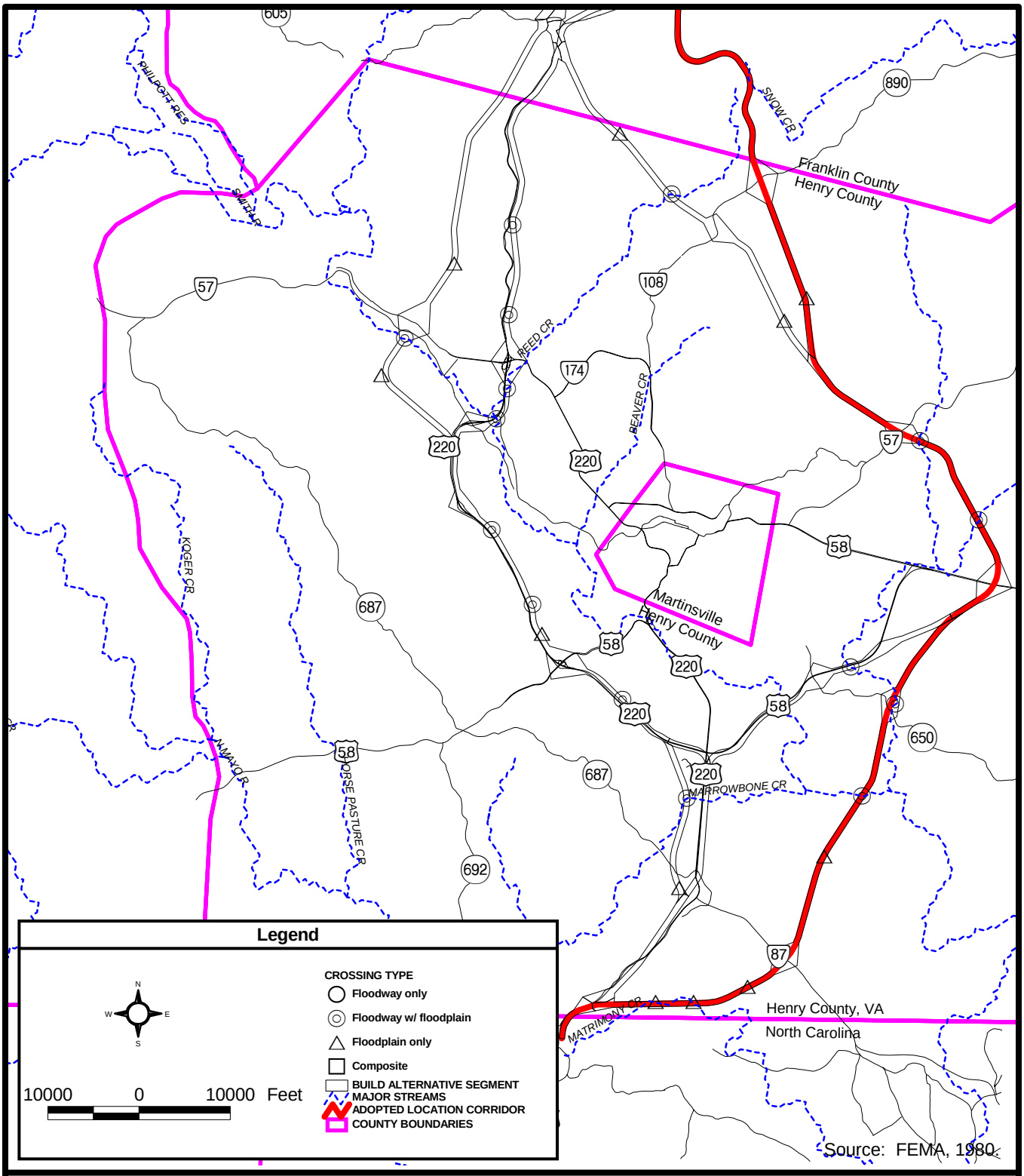
**FIGURE 4.7-16**
**100-YEAR FLOODPLAIN CROSSINGS OF ROANOKE COUNTY AND CITY OF ROANOKE**




Source: FEMA, 1978, 1979, 1981.

I-73 Location Study

**FIGURE 4.7-17**
**100-YEAR FLOODPLAIN CROSSINGS OF FRANKLIN COUNTY**




I-73 Location Study

**FIGURE 4.7-18**
**100-YEAR FLOODPLAIN CROSSINGS OF HENRY COUNTY**

Option 1 would entail the least number of regulated floodway crossings, at six. By comparison, Options 3 and 3c would entail the greatest number of regulated floodway crossings, at 28 each. The relatively large number of floodway crossings associated with these options is largely attributed to parallel encroachments along Lick Branch, Ore Branch, Grassy Creek, and Little Reed Creek. The ALC would entail the crossing of 19 regulated floodways.

Segment 153 of Build Alternative Options 2, 2a, 2b, 2c, and the ALC would be located approximately 14,000 feet (measured along the river channel) downstream of a small dam on the Pigg River. Although FEMA, at the time of its 1980 Flood Insurance Study, stated that "…rapid failure of the dam would be unlikely", the DCR Dam Safety Office is of the opinion that the dam in "its current state of operation and maintenance has the potential to impact downstream areas in ways not anticipated under normal major flood events" (i.e., increased risk of flood damage resulting from reported "short-duration, shallow overflows" and possible "erosion of abutments").

**Table 4.7-8**
**100-YEAR FLOODPLAIN ENCROACHMENTS AND FLOODWAY CROSSINGS**

| Alternative | | Number of Floodway Crossings | Number of Floodplain Encroachments | Named Streams Affected |
|---|---|---|---|---|
| TSM | | 4 | 7 | Buffalo Cr., Beaverdam Cr., Lick Run, Blackwater R. Pigg R., Smith R., Grassy Cr. |
| Build Alternative Option | 1 | 6 | 23 | Blackwater R.*, Pigg R.*, Doe Run, Big Chestnut Cr., Draper Mill Cr., Smith R.*, Roanoke R.*, Leatherwood Cr.*, Matrimony Cr. |
| | 1a | 8 | 21 | Blackwater R.*, Pigg R.*, Reed Cr.*, Beaver Cr.*, Smith R.*, Roanoke R.*, Leatherwood Cr.*, Matrimony Cr. |
| | 2 | 12 | 26 | Maggodee Cr.*, Blackwater R.*, Pigg R.*, South Fork Little Chestnut Cr., Big Chestnut Cr., Back Cr.*, Reed Cr.*, Beaver Cr.*, Lick Run*, Roanoke R.*, Smith R.*, Leatherwood Cr.* |
| | 2a | 12 | 26 | Maggodee Cr.*, Blackwater R.*, Pigg R.*, South Fork Little Chestnut Cr., Big Chestnut Cr., Back Cr.*, Reed Cr.*, Beaver Cr.*, Lick Run*, Roanoke R.*,Smith R.*, Leatherwood Cr.* |
| | 2b | 21 | 28 | Back Cr.*, Ore Branch*, Back Cr. Tributary, Maggodee Cr.*, Blackwater R.*, Pigg R.*, South Fork Little Chestnut Cr., Big Chestnut Cr., Reed Cr.*, Beaver Cr.*, Lick Run*, Roanoke R.*, Ore Branch*, Smith R.*, Leatherwood Cr.* |
| | 2c | 13 | 25 | Maggodee Cr.*, Blackwater R.*, Pigg R.*, South Fork Little Chestnut Cr., Big Chestnut Cr., Back Cr.*, Reed Cr.*, Beaver Cr.*, Lick Run*, Roanoke R.*, Smith R.*, Leatherwood Cr.* |
| | 3 | 28 | 26 | Ore Branch*, Back Cr. Tributary, Lick Run* (3), Roanoke R.*, Ore Branch*, Back Cr.*, Maggodee Cr.*, Blackwater R.*, Pigg R.*, Little Reed Cr.*, Smith R.*, Jordan Cr.*, Grassy Cr.* |
| | 3a | 22 | 28 | Murray Branch*, Back Cr.*, Back Cr. Tributary, Lick Run*, Roanoke R.*, Ore Branch*, Maggodee Cr.*, Blackwater R.*, Pigg R.*, Little Reed Cr.*, Smith R.*, Jordan Cr.*, Grassy Cr.* |
| | 3b | 25 | 25 | Back Cr.*, Ore Branch*, Back Cr. Tributary, Lick Run*, Roanoke R.*, Maggodee Cr.*, Blackwater R.*, Pigg R.*, Little Reed Cr.*, Smith R.*, Jordan Cr.*, Grassy Cr.* |
| | 3c | 28 | 26 | Ore Branch*, Back Cr. Tributary, Lick Run*, Roanoke R.*, Ore Branch*, Back Cr.*, Maggodee Cr.*, Blackwater R.*, Pigg R.*, Little Reed Cr.*, Smith R.*, Jordan Cr.*, Grassy Cr.* |
| | 4 | 10 | 18 | Blackwater R.*, Pigg R.*, Little Reed Cr.*, Smith R.*, Smith R. tributary, Rock Run, Roanoke R.*, Roanoke R. tributary, Barnhardt Cr., Back Cr.*, Jordan Cr.*, Grassy Cr.*, Maggodee Cr.* |
| | ALC | 19 | 28 | Lick Run*, Roanoke R.*, Back Cr.*, Maggodee Cr.*, Blackwater R.*, Pigg R.*, South Fork Little Chestnut Cr., Big Chestnut Cr., Reed Cr.*, Beaver Cr.*, Smith R.*, Leatherwood Cr.* Doe Run, Matrimony Cr |

Note:* Indicates presence of floodway as well.

#### 4.7.4.3 Mitigation

The ALC will be designed to avoid and minimize floodplain encroachments to the fullest degree practicable. A Location Hydraulic Study will be performed as part of the preliminary engineering phase to identify engineering methods that would result in increases to the 100-year floodplain elevations of one foot (0.3048 meters) or less. For intermittent and smaller perennial streams, culverts will be sized to minimize effects. For bridging of larger streams and rivers, abutments will be placed to avoid or minimize floodplain encroachments and support structures will be placed to allow for unrestricted flow within the floodway. Where encroachments into a designated or proposed floodway are unavoidable, engineering analyses will be performed commensurate with the level of encroachment and coordination with the FEMA and local agencies will be carried out to ensure that the 1-foot criterion will not be exceeded. A comprehensive dam safety inspection of the Pigg River dam will likely be required.

### 4.7.5 Threatened or Endangered Species

Polygons having a one-half-mile radius centered around off-set coordinates of the population or habitat (DCR, Division of Natural Heritage, as revised through 24 February 2000) were initially used as indicators of possible impacts. In areas where proposed corridors encroach upon one of these polygons, site reconnaissance was performed to identify possible impacts to populations or suitable habitat in the vicinity. Approximate locations of populations of threatened or endangered species and the natural heritage resource areas containing them (DCR, Division of Natural Heritage, 2004) are shown in Figures 4.7-19 through 4.7-21. Figures showing populations of threatened or endangered species affected by previously considered alternatives are provided in the DEIS and the Natural Resources Technical Report (VDOT, 2000).

#### 4.7.5.1 Federal Listed Threatened or Endangered Species

TSM Alternative

The TSM Alternative would also result in construction over or in close proximity to suitable habitat for the Roanoke logperch located in the Pigg River near Rocky Mount and the Smith River near southwestern Martinsville (Table 4.7-9).

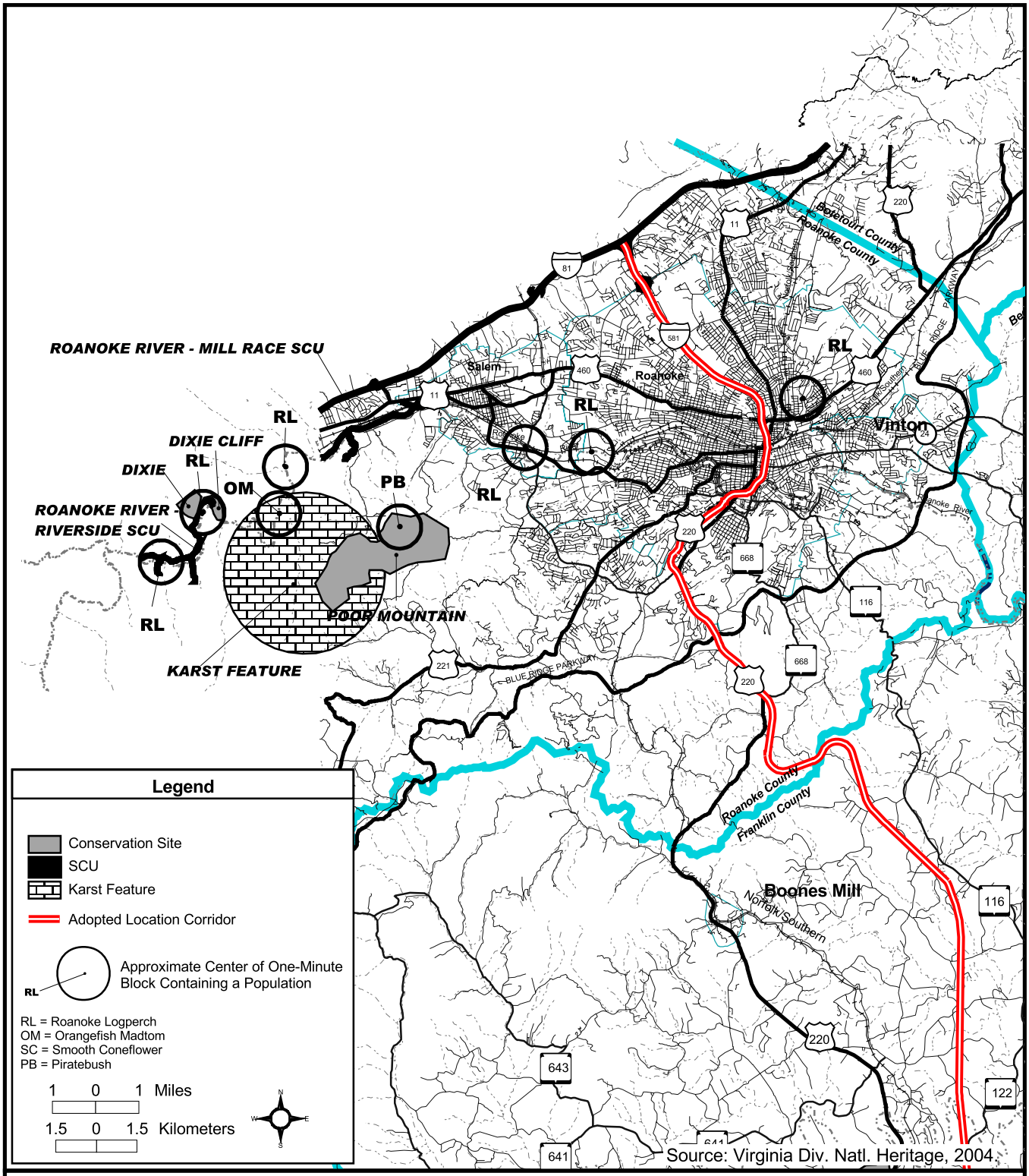
Build Alternative

As discussed below, at least one suitable habitat for populations of the Roanoke logperch would be potentially impacted by new bridge construction under each of the build options under consideration. One marginally suitable habitat for a small population of the Roanoke logperch would be subjected to potential impacts associated with new bridge construction over the Pigg River under the ALC (Figure 4.7-23). The range of suitable habitat for this fish species is somewhat narrowly defined due to the populations' sensitivity to disturbances and specific life history needs. Because of the width of the streams affected and the resulting need for placement of bridge piers, there do not appear to be practicable avoidance alternatives to impacting suitable aquatic habitat for the Roanoke logperch for some of the Build Alternatives. Temporary impacts associated with earthwork operations in the vicinity of fish habitat will be avoided or minimized through use of best available siltation and erosion control measures and other conservation measures to be worked out through Section 7 formal consultation. Locations of proposed bridged stream crossings potentially affecting suitable habitat for this fish species are described in Table 4.7-9.

Factors that have adversely affected Roanoke logperch populations in various locations include turbidity and siltation, chemical spills, organic pollution, stream channelization and impoundment, and cold-water releases (Moser, 1992). With respect to actions associated with not only the build alternative options but also the TSM alternative, primary impacts to habitat important to populations of Roanoke logperch would include placement of fill material for temporary construction causeways and placement of bridge support structures (piles). Areas disturbed by temporary construction features would be restored immediately following construction; however, several hundred square feet of habitat (stream bottom) could be lost to bridge support structures at each of the proposed bridged stream crossings. Although this loss directly attributable to roadway construction is not considered to be severe with respect to total habitat available within the study area, cumulative impacts associated with secondary development around interchanges, urbanization, unrestricted

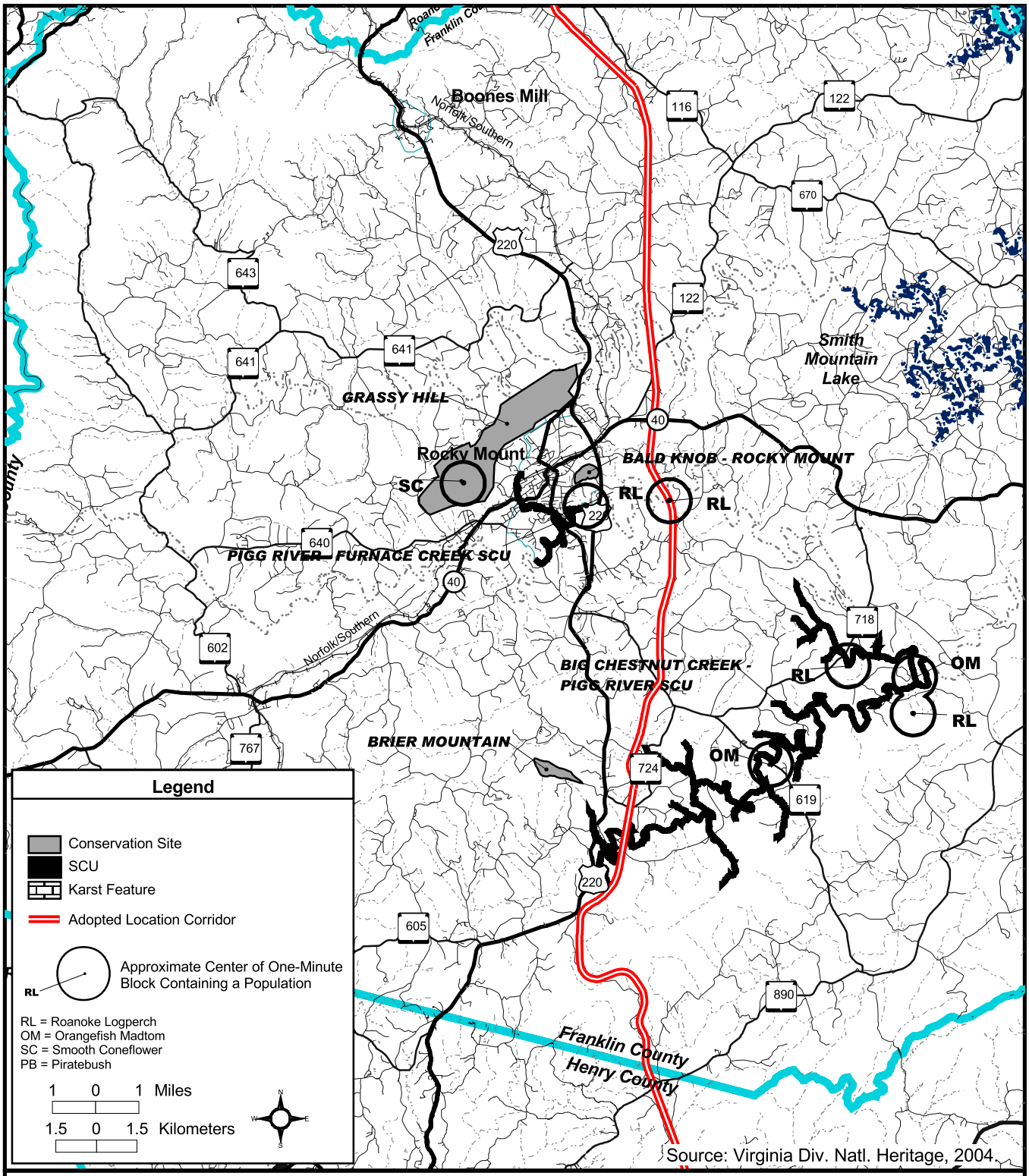
agriculture practices, etc. may be severe and are considered in the biological assessment Secondary impacts would consist of storm water runoff draining from the interstate. Storm water runoff impacts are considered to be negligible if mitigation measures and best management practices set forth in Section 4.6.1.2 are properly implemented and maintained. Although VDOT can appropriately mitigate storm water impacts directly attributable to roadway construction and operation of the facility, addressing cumulative impacts from secondary development within the watershed will require the local jurisdictions to address stormwater runoff as that development is approved. The Roanoke logperch is a bottom dweller and bottom feeder. Transmission of vibrations from the road surface, through support structures, and into the substrate could also lead to initial habitat disturbance immediately surrounding the structures. Insufficient studies currently exist to determine the extent of disturbance or whether populations would return into affected areas following an initial period of adjustment.

(This area left blank intentionally)




I-73 Location Study

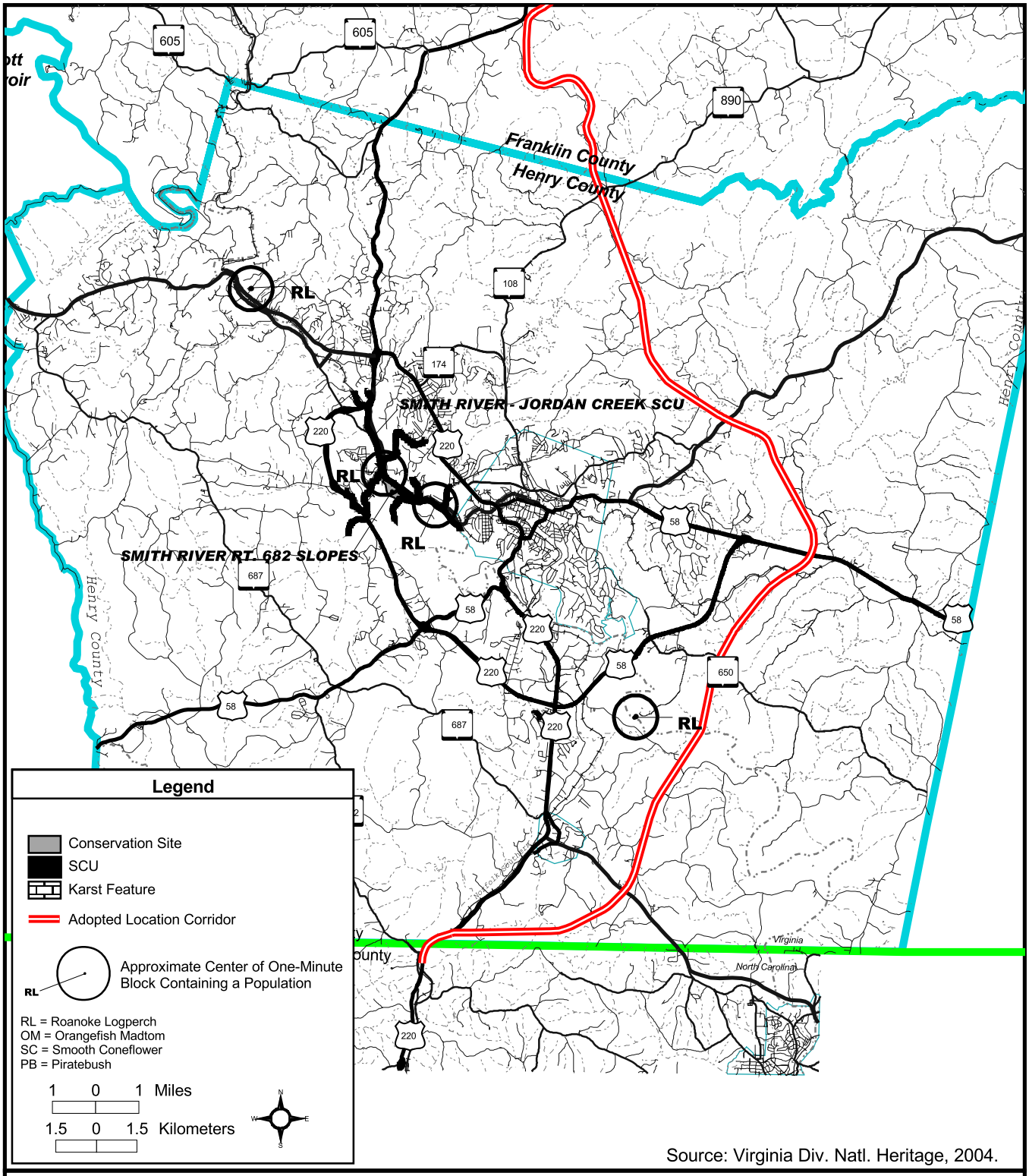
**FIGURE 4.7-19**
**THREATENED AND ENDANGERED SPECIES POPULATIONS OF ROANOKE COUNTY AND CITY OF ROANOKE**




Source: Virginia Div. Natl. Heritage, 2004.

I-73 Location Study

**FIGURE 4.7-20**
**THREATENED AND ENDANGERED SPECIES POPULATIONS OF FRANKLIN COUNTY**




Source: Virginia Div. Natl. Heritage, 2004.

I-73 Location Study

**FIGURE 4.7-21**
**THREATENED AND ENDANGERED SPECIES POPULATIONS OF HENRY COUNTY**

## Table 4.7-9
## THREATENED AND ENDANGERED SPECIES

| Alternative | | Location of Proposed Construction in or Near Suitable Habitat or Population | | | |
|---|---|---|---|---|---|
| | | Federal Listed Species | | State Listed Species | |
| | | **Roanoke logperch (Percina Rex)** | **Smooth Coneflower (Echinacea laevigata)** | **Orangefin Madtom (Notorus gilberti)** | **Piratebush (Buckleya distichophylla)** |
| TSM | | 1 - Bridge crossing at Pigg River near Rocky Mount (segment 382)<br>1 - Smith River near Martinsville (segment 391) | No populations affected. | No populations affected. | No populations affected. |
| Build Alternative Option | 1 | 1 - Bridge crossing at Pigg River SW of Gladehill (segment 152) | No populations affected. | 1 - Bridge crossing at Pigg R. near confluence with Big Chestnut Creek (segment 152) | No populations affected. |
| | 1a | No populations affected. | No direct effects but within DNH Conservation Site buffer extending around Grassy Hill Natural Area Preserve | No suitable habitat observed or reported. | No populations affected. |
| | 2 | 1 - Bridge crossing at Pigg River east of Rocky Mount (segment 153)<br>1 - Bridge crossing at Smith River at U.S. Route 58 near South East Martinsville (segment 391) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 2a | 1 - Bridge crossing at Pigg River east of Rocky Mount (segment 153)<br>1 - Bridge crossing at Smith River at U.S. Route 58 near South East Martinsville (segment 391) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 2b | 1 - Bridge crossing at Pigg River east of Rocky Mount (segment 153)<br>1 - Bridge crossing at Smith River at U.S. Route 58 near South East Martinsville (segment 391) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 2c | 1 - Bridge crossing at Pigg River east of Rocky Mount (segment 153)<br>1 - Bridge crossing at Smith River at U.S. Route 58 near South East Martinsville (segment 391) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 3 | 1 - Bridge crossing at Pigg River on U.S. Route 220 Rocky Mount Bypass (segment 382)<br>1 - Bridge crossing at Smith River north of Fieldale (segment 388) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 3a | 1 - Bridge crossing at Pigg River on U.S. Route 220 Rocky Mount Bypass (segment 382)<br>1 - Bridge crossing at Smith River north of Fieldale (segment 388) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 3b | 1 - Bridge crossing at Pigg River on U.S. Route 220 Rocky Mount Bypass (segment 382)<br>1 - Bridge crossing at Smith River north of Fieldale (segment 388) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 3c | 1 - Bridge crossing at Pigg River on U.S. Route 220 Rocky Mount Bypass (segment 382)<br>1 - Bridge crossing at Smith River north of Fieldale (segment 388) | No populations affected. | No suitable habitat observed or reported. | No populations affected. |
| | 4 | 1 - Bridge crossing at upper Roanoke River near Glenvar (segment 371)<br>1 - Bridge crossing at Smith River near Stanleytown (segment 237B) | No direct effects but within DNH Conservation Site buffer extending around Grassy Hill Natural Area Preserve | 1 - Bridge crossing at the upper Roanoke River near Glenvar (segment 371) | Population of unknown quantity 1,000 ft (305 m) north of Poor Mt/ Long Ridge NAP |
| | ALC | 1 - Bridge crossing at Pigg River east of Rocky Mount (segment 153) | No populations affected. | No populations affected. | No populations affected. |

Segment 192A of Options 1a and 4 was aligned during the preliminary engineering phase to avoid known populations of the smooth coneflower. As a result, segment 192A is located 615 feet from the Grassy Hill Natural Area Preserve. No other populations of smooth coneflower were reported or observed within areas of possible roadway construction where habitat suitable for the smooth coneflower was identified These field verification efforts to locate and verify known and suspected populations of the smooth coneflower were coordinated with the DCR, Division of Natural Heritage. ,

For major Federal actions that have the potential to impact populations of federally threatened or endangered plant or animal species or habitat that has been designated critical to their survival, Section 7 of the Endangered Species Act requires the agency to prepare a biological assessment to determine the project's effect on those listed species that may exist in the project impact area. A biological assessment has been prepared and included in the Appendices to the final EIS. The biological assessment was prepared based on survey results that were conducted at various stream and river crossings of the ALC in 2002. Additional surveys were conducted in 2004 when changes had to be made to the segments comprising the ALC due to the designation of the Southeast Roanoke Neighborhood historic district. The stream and river crossings that were ultimately surveyed for the Roanoke logperch were based on coordination with the Virginia Department of Game and Inland Fisheries and the USFWS. As a result of these surveys, the Pigg River crossing of the ALC was the only location where a population of the Roanoke logperch was found and subsequently, the only location where Section 7 consultation would be required for the Roanoke logperch. A biological assessment was prepared, and FHWA provided it to the USFWS in December of 2003, requesting that they initiate formal consultation in accordance with Section 7. The USFWS was unable to initiate formal consultation because of insufficient information and requested additional information related to the design, construction and scheduling of the Pigg River crossing. Because this information is not yet available, FHWA withdrew its request to initiate formal consultation in February of 2004. In withdrawing its request, FHWA noted that the USFWS thought it premature to complete formal consultation prior to completion of the EIS because changes to projects during design and constant updates in the USFWS' knowledge of species often invalidates the consultation (USFWS letter to Ms. Bier dated March 18, 2003; USFWS letter to FHWA dated November 25, 2002). In withdrawing its request, FHWA also noted that any Record of Decision that was issued would need to be conditioned to reflect the consultation that was still needed and acknowledged that the survey work would likely need to be revisited during the design phase of the project.

Separate from this project, VDOT funded a range-wide assessment of habitat suitability for the Roanoke logperch in the VDOT Salem District, which was completed in 2006. As part of this survey effort, 40 sites were sampled in four different watersheds. Two of the watersheds represented watersheds where the Roanoke logperch was known to exist while the other two watersheds represented watersheds where no populations of the Roanoke logperch had been found based on previous identification efforts. As a result of the range-wide assessment, populations of the Roanoke logperch were discovered at three new sites in the watersheds where they were known to already exist and populations were discovered at three sites within the two watersheds where they were not known to exist. This represents the first discovery of the Roanoke logperch in a new watershed in 28 years. The report concluded that the species is more widely distributed than previously thought and suitable habitat is more widespread than previously believed. Of the six sites where the Roanoke logperch was discovered, one site is considered to have exceptional density and three are dense enough for the populations to be considered "core populations". None of the sites were near the proposed route of I-73. The results of the range-wide assessment will be used in any future consultation with the USFWS to further refine knowledge concerning the status of the species and its distribution.

Mitigation

Specific mitigation measures, conservation measures and restrictions during construction would be established during Section 7 formal consultation with the USFWS. Riparian restoration on waters containing federally listed species is considered a high priority form of mitigation and conservation because it improves water quality, which translates into improved habitat, not only for the species, but for the stream fauna as well. Riparian restoration also serves to mitigate habitat impacts for migratory birds and just about all terrestrial wildlife species. FHWA and VDOT will look at waters within and outside the study area where known populations or suitable habitat for the Roanoke logperch exists to identify opportunities to restore riparian habitat. Preliminary coordination with the USFWS has identified the North and South Forks of the

Roanoke River in Mongomery County, the Pigg River and Big Chestnut Creek in Franklin County, and the Smith River in Patrick County as prime candidates for riparian restoration. A logical starting point would be the Pigg River located just downstream of U.S. 220 in central Franklin County. This section of the river not only supports several populations of Roanoke logperch, but also contains stream segments that are impaired due to high fecal coliform counts and sedimentation resulting largely from agricultural runoff. FHWA and VDOT are committed to riparian restoration and will work with the USFWS during formal consultation to identify opportunities for restoration, determine the extent of the restoration, and to determine the parties and approach that is best suited for ensuring that the mitigation is carried out. Any mitigation that FHWA and VDOT commit to would factor into formal consultation with the USFWS and their biological opinion.

Based on preliminary engineering work, VDOT has determined that the proposed ALC crossing of the Pigg River in the vicinity of the Roanoke logperch in Franklin County will be on a horizontal curve alignment, allowing for a perpendicular crossing of the Pigg River and eliminating the need for skewed piers. The grade of Interstate 73 at the crossing is approximately 50-feet above the flood elevation, and the overall length of the bridge is estimated at 530 feet. Economical spans for a bridge of this height and length would be in the range of 150-200 feet. Curved steel girders supporting a concrete deck are the likely choice for construction materials. The normal flow width of the Pigg River in this area is approximately 75-100 feet, which means that VDOT should be able to span the river and avoid any construction in the normal flow of the river.

Silt fences, siltation curtains, and other practicable means to provide erosion and sedimentation control will be implemented during construction. Permanent stormwater BMPs will be implemented to reduce the discharge of pollutants associated with highway stormwater runoff after construction. A Stormwater Management Plan will be developed in accordance with VDOT's ESC & SWM Program Specifications. This plan will provide the location, type, size, and construction details for stormwater management Best Management Practices (BMPs). It appears that BMPs can be implemented that will be effective in capturing runoff from the project and "treating" that runoff to remove pollutants that may have an adverse effect on the Roanoke logperch. A final commitment on the type, size, and location of stormwater management facilities along with measures that can be implemented to enhance their effectiveness will be made during final design and during formal consultation with the FWS when the hydrologic and hydraulic information needed to make that decision is known.

The extent of work in waters containing populations of the Roanoke logperch will be established through consultation with FWS under the Endangered Species Act. FWS typically calls for implementation of specific best management practices during the spawning period of mid-April through May. A more-detailed discussion of available and proposed measures to mitigate water quality degradation within aquatic habitat critical to the Roanoke logperch is presented in sections 4.6.3.3 and 4.6.3.4 of this EIS as well as the biological assessment.

Other mitigation measures that FHWA and VDOT are willing to consider through the formal consultation process that may help to conserve the Roanoke logperch and aid its viability, include:

- Removing or breaching the abandoned hydroelectric dam on the main stem of the Pigg River;
- Exploring the possibility with Franklin County of developing a Pigg River watershed management plan;
- Funding efforts with the USFWS to reintroduce the Roanoke logperch into streams and rivers within the study area;
- Exploring with the USFWS the practicality of creating habitat for the Roanoke logperch through the introduction of clean gravel and pebbles;
- Exploring the practicality of redirecting runoff from the Pigg River crossing to stormwater management BMPs to eliminate the direct drainage of stormwater into the Pigg River;

Avoidance is considered to be the first crucial step towards effectively mitigating environmental effects. As previously discussed, Segment 192A of Options 1a and 4 was aligned during the preliminary engineering phase to avoid known populations of smooth coneflower. Since realignment, the Virginia Division of Natural Heritage has mapped a larger area of concern which now includes buffer zones around known smooth

coneflower populations and is known as the Grassy Hill conservation unit. Although segment 192A would extend into one of these buffer zones, it is expected that the segment would continue to avoid direct encroachment into the population itself. The ALC alignment does not impact any of these buffer zones.

#### 4.7.5.2 State Listed Threatened or Endangered Species

TSM Alternative

The TSM Alternative would result in no effects to state listed threatened and endangered species populations of the region.

Build Alternative

Suitable habitat for populations of the orangefin madtom within the Pigg River and the lower reaches of Big Chestnut Creek will be subjected to impacts associated with new bridge construction under Segment 152 of Option 1. Suitable habitat for a population of the orangefin madtom within the upper Roanoke River would be subjected to impacts associated with new bridge construction under Segment 371 of Option 4. The range of suitable habitat for this fish species is somewhat narrowly defined due to the populations' sensitivity to disturbances and specific life history needs. Because of the need for perpendicular stream crossings, the width of the streams affected, and the resulting need for placement of bridge piers, no practicable avoidance alternative is available with respect to suitable aquatic habitat for the orangefin madtom. Temporary impacts associated with earthwork operations in the vicinity of fish habitat will be avoided or minimized through use of best available siltation and erosion control measures. Locations of proposed bridged stream crossings potentially affecting suitable habitat for this fish species are described in Table 4.7-9.

Primary impacts to habitat important to populations of orangefin madtom would include placement of fill material for temporary construction causeways and placement of bridge support structures (piers). As discussed in Section 4.7.2, areas disturbed by temporary construction features would be restored immediately following construction; however, several tens of meters of habitat (stream bottom) would be lost to bridge support structures at each of the proposed bridged stream crossings. This loss is not considered to be severe with respect to total habitat available within the study area. No interference with migration of this fish species would result from bridge construction. Secondary impacts would consist of stormwater runoff draining from the interstate. Stormwater runoff impacts are considered to be negligible if mitigation measures and best management practices set forth in Section 4.6.1.2 are properly implemented. The orangefin madtom is a bottom dweller and a bottom feeder, and is reported to be particularly sensitive to habitat disturbances. Transmission of vibrations from the road surface, through support structures, and into the substrate could lead to initial habitat disturbance immediately surrounding the structures. Insufficient studies currently exist to determine the extent of disturbance or whether populations would return into affected areas following an initial period of adjustment.

Segment 371 of Option 4 of the Build Alternative was aligned during the preliminary engineering phase to avoid known large populations of piratebush known to exist within the Poor Mountain/Long Ridge NAP. To attain grades required to meet interstate design standards, a population of piratebush located on private property approximately 1,000 feet (305 meters) north of the 86-acre (35-hectare) parcel of the Poor Mountain/Long Ridge NAP will be impacted by Segment 371 of Option 4 of the Build Alternative. The exact extent of and number of individuals comprising this population are not currently known, thus specific impacts and the severity of impacts have not yet been determined. If Option 4 is selected, additional surveys and consultation with the Virginia Department of Agriculture and Consumer Services will be required.

Mitigation

The ALC will affect no known or reported populations of state-listed threatened or endangered species. However, as documented above, any riparian restoration carried out as mitigation for the Roanoke logperch would dually benefit those species dependent upon the streams and adjacent riparian habitat.

### 4.7.6 Wild and Scenic Rivers

No federally listed wild and scenic rivers are located within the study area or immediately downstream of the study area (U.S. Department of the Interior, 1981, 1998). No legislatively designated components of the Virginia Scenic Rivers Program are located within the study area or immediately downstream of the study area (DCR, 2002). Those attributes of the Blackwater River which merit its consideration for possible future state inclusion (recreational boating opportunities, scenic qualities, warmwater fisheries) would not be significantly diminished by construction of the No-Build Alternative, the TSM Alternative, or any of the Build Alternative options. If any river segment within the corridor is designated as a component of the Virginia Scenic Rivers Program in the future, dams or other impediments to natural flows would be prohibited (unless authorized by the General Assembly) and all use and development of water and water related land resources would require evaluation to ensure that they do not alter or destroy the scenic nature of the designated segment.

### 4.7.7 Other Unique or Limited Natural Resources

#### 4.7.7.1 Geologic Hazards, Mineral Resources, and Caves

The ALC will traverse the following fault zones: the Salem fault and Fries fault (roughly paralleling the Roanoke/Franklin county line), the Bowens Creek fault (trending northeast/southwest in southern Franklin County and northern Henry County), the Ridgeway fault (trending northeast/southwest in the vicinity of the community of Ridgeway in southern Henry County), and the Chatham fault (trending northeast/southwest in the southeastern-most portion of the study area). The only current economic mineral resources within the study area consist of crushed stone (for road stone and aggregate), sand and gravel, and clay deposits for brick production (in Roanoke County). Currently economic mineral resource operations within the study area are listed in Table 4.7-10. In a March 20, 2002 letter, the Virginia Cave Board confirmed that no caves would be affected by any alternatives under consideration.

TSM Alternative

The TSM Alternative could affect the W.W. Boxley Company's crushed and dimension stone operation located just off U.S. Route 220 in Henry County. Effects would include encroachment upon current mineral reserves and would likely affect site access. Crushed stone sources (primarily biotite gneiss) are common across the region and are not considered to be limited or unique resources.

Build Alternative

Only Option 1 would effect no currently economic mineral operations. Only Segment 371 of Option 4 would operation encroach upon a formerly exploited economic geologic resource (sandstone quarrying at the Arrow Sand Company site in northwestern Roanoke County). Because of their proximity to proposed interstate alignments, other currently active sites of economic mineral resource operations listed in Table 4.7-10 could be affected with respect to accessibility. Access to ACCO Stone Company's crushed stone operation near the I-81/I-581 interchange in Roanoke County and Rockydale Quarries Corporation's crushed stone operation just off U.S. Route 220 near the Blue Ridge Parkway may be temporarily affected by maintenance of traffic operations associated with construction of the ALC. Crushed stone sources (primarily biotite gneiss) and sand and gravel deposits are common across the region and are not considered to be limited or unique resources. With respect to mineral resources, short-term benefits of the Build Alternative would include increased use of regional mineral resources (such as crushed stone) during project construction and associated contributions to the regional economy. Long-term benefits would include enhanced interstate commerce and associated benefits to the regional economy.

Mitigation

Due to brittle fracturing and weathering of rock types within the aforementioned fault zones, slopes are relatively less stable and relatively more erodible than similar slopes in other areas. Appropriate design standards and erosion control measures will be implemented during ensuing design and construction phases

to address site-specific geologic hazards associated with these fault zones. Traffic maintenance plans will be developed during project design stages to minimize the effects of construction on existing accesses to economic mineral operations. The project will be designed to maintain or enhance access to affected operations.

(This area left blank intentionally)

**Table 4.7-10**
**EFFECTED ECONOMIC MINERAL RESOURCE OPERATIONS**

| Alternative | | No. Sites Affected | Resource Affected / Name of Operation or Owner | Location | Affect [1] |
|---|---|---|---|---|---|
| TSM | | 1 | Biotite gneiss (dimension and crushed stone) / W.W. Boxley Company | Off U.S. Route 220 near Fieldale | Access |
| Build Alternative Option | 1 | 0 | None. | Not applicable. | None |
| | 1a | 1 | Biotite gneiss; crushed stone, and sand / Wilson Quarries | Near U.S. Route 58/ U.S. Route 220 Interchange in Henry County | Access |
| | 2 | 2 | Biotite gneiss; crushed stone, and sand / Wilson Quarries | Near U.S. Route 58/ U.S. Route 220 Interchange in Henry County | Access |
| | | | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | 2a | 2 | Biotite gneiss; crushed stone, and sand / Wilson Quarries | Near U.S. Route 58/ U.S. Route 220 Interchange in Henry County | Access |
| | | | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | 2b | 3 | Biotite gneiss; crushed stone, and sand / Wilson Quarries | Near U.S. Route 58/ U.S. Route 220 Interchange in Henry County | Access |
| | | | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | | | Crushed stone / Rockydale Quarries Corp. | Off U.S. Route 220 near Blue Ridge Parkway | Access |
| | 2c | 2 | Biotite gneiss; crushed stone, and sand / Wilson Quarries | Near U.S. Route 58/ U.S. Route 220 Interchange in Henry County | Access |
| | | | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | 3 | 3 | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | | | Crushed stone / Rockydale Quarries Corp. | Off U.S. Route 220 near Blue Ridge Parkway | Access |
| | | | Biotite gneiss (dimension and crushed stone) / W.W. Boxley Company | Off U.S. Route 220 near Fieldale | Access |
| | 3a | 2 | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | | | Biotite gneiss (dimension and crushed stone) / W.W. Boxley Company | Off U.S. Route 220 near Fieldale | Access |
| | 3b | 3 | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | | | Crushed stone / Rockydale Quarries Corp. | Off U.S. Route 220 near Blue Ridge Parkway | Access |
| | | | Biotite gneiss (dimension and crushed stone) / W.W. Boxley Company | Off U.S. Route 220 near Fieldale | Access |
| | 3c | 3 | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | | | Crushed stone / Rockydale Quarries Corp. | Off U.S. Route 220 near Blue Ridge Parkway | Access |
| | | | Biotite gneiss (dimension and crushed stone) / W.W. Boxley Company | Off U.S. Route 220 near Fieldale | Access |
| | 4 | 2 | Sandstone / Arrow Sand Company | Off Route 694 west of Salem in Roanoke County | Reduction |
| | | | Biotite gneiss (dimension and crushed stone) / W.W. Boxley Company | Off U.S. Route 220 near Fieldale | Access |
| | ALC | 2 | Crushed stone / ACCO Stone Company | Near I-81 / I-581 Interchange in Roanoke County | Access |
| | | | Crushed stone / Rockydale Quarries Corp. | Off U.S. Route 220 near Blue Ridge Parkway | Access |

[1] Reduction = Reduction in mining area due to encroachment. Access = Changes in access due to interchange or service road.

### 4.7.7.2 Soils, Including Prime Farmland Soils

A wide array of soil types occurs within the study area. For the purpose of environmental assessment, those soils considered to be unique or limited resources consist of prime farmland soils and hydric soils. By definition, soil units associated with prime farmlands are considered to be a unique natural resource. Primary environmental effects will consist of conversion of existing soil surfaces to highway surface and right-of-way. In the absence of appropriate erosion and sedimentation control measures, secondary effects could consist of increased soil erosion rates in areas receiving highway runoff. As a unique or limited soil type, effects to hydric soils will be equivalent to those total palustrine wetland effects reported for each of the alternatives under Section 4.7.3. Refer to the Land Use, Socioeconomic, and Farmlands Technical Report (VDOT, 2000) for more information on soils, including prime farmland soils.

TSM Alternative

The TSM Alternative would result in 25.9 acres (10.5 hectares) of prime farmland soils and 2.1 acres (0.8 hectares) of hydric soils being converted to roadway surface and right-of-way (Table 4.7-11).

Build Alternative

Construction of those options associated with the Build Alternative will convert soils mapped as prime farmland soils by the USDA, NRCS to roadway surface and right-of-way. Total areas of prime farmland soils converted under each of the options are shown in Table 4.7-11. Construction of Option 2c would result in the greatest area of prime farmland soils conversion (at 164.7 acres [66.7 hectares]), while construction of Options 3b and 4 would result in the least area of conversion (with roughly 73 acres [29 hectares] each). The ALC would affect 83.6 acres (34.8 hectares) of prime farmland soils. The quantities shown apply to areas of soil units mapped by NCRS, and the areas may not necessarily be reflective of current land uses. These farmland conversion scores are illustrated on NRCS form CPA-106 in Appendix D.

Construction of those options associated with the Build Alternative also convert hydric soils associated with the various types of palustrine wetlands found within the study area to roadway surface and right-of-way. Total areas of hydric soils converted under each of the options are also shown in Table 4.7-11. Construction of Option 2, Option 2b, or Option 2c would entail the greatest area of hydric soils conversion (at 27.18 acres [11.0 hectares]), while construction of Option 3c would entail the least area of conversion (with 7.64 acres [3.094 hectares]). The ALC would affect 17.5 acres (7.1 hectares) of hydric soils.

**Table 4.7-11**
**PRIME FARMLAND SOILS AND HYDRIC SOILS CONVERTED**

| Alternative | | Total Area of Prime Farmland Soils Converted acres (hectares) | | Total Area of Hydric Soils Converted acres (hectares) | |
|---|---|---|---|---|---|
| TSM | | 54.7 | (22.1) | 21.95 | (8.9) |
| Build Alternative Option | 1 | 120.9 | (48.9) | 20.15 | (8.2) |
| | 1a | 83.6 | (33.8) | 19.48 | (7.9) |
| | 2 | 148.3 | (60.0) | 26.45 | (10.7) |
| | 2a | 145.9 | (59.1) | 26.45 | (10.7) |
| | 2b | 128.7 | (52.1) | 10.71 | (4.3) |
| | 2c | 164.7 | (66.7) | 10.71 | (4.1) |
| | 3 | 94.3 | (38.2) | 4.91 | (2.0) |
| | 3a | 124.2 | (50.3) | 4.91 | (2.0) |
| | 3b | 72.7 | (29.4) | 4.91 | (2.0) |
| | 3c | 126.1 | (51.0) | 3.69 | (1.5) |
| | 4 | 73.4 | (29.7) | 13.09 | (5.3) |
| | ALC | 83.6 | (34.8) | 17.5 | (7.1) |

Source: USDA, Soil Conservation Service, 1989, 1994; USDA, NRCS, 1997.

Mitigation

With the widespread distribution of prime farmland soils throughout the study area, no feasible avoidance alternative exists for those build options under consideration. All practicable measures will be employed during design phases of the ALC to minimize effects to soils mapped as prime farmland soils. Any hydric soils converted to highway uses will be replicated using best available technologies as part of wetland mitigation efforts (see Section 4.7.3.2). Erosion of soils within and adjoining areas disturbed by construction will be minimized using best management practices implemented as part of an approved Erosion and Sedimentation Control Plan for the project.

(This area left blank intentionally)