

**ECONOMIC ANALYSIS
OF CRITICAL HABITAT DESIGNATION
FOR THE BRAUN'S ROCKCRESS**

May 2004

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1. On June 3, 2003, the U.S. Fish and Wildlife Service (the Service) proposed designation of critical habitat for the Braun's rockcress (*Arabis perstellata*) on approximately 1,008 acres in Tennessee and Kentucky. In November 2003, the Service proposed expanding three previously proposed units and adding two units, increasing the proposed designation to 1,600 acres in Tennessee and Kentucky. The purpose of this report is to identify and analyze potential economic impacts associated with the designation of critical habitat for *Arabis perstellata*.¹ The original version of this report was prepared by Industrial Economics, Incorporated (IEc), under contract to the Service's Division of Economics, and analyzed the critical habitat designation as proposed on June 3, 2003.
2. This report was made available to the public for comment at the time that the proposed rule was published. This updated version reflects information provided by the public during the comment period. It also includes new information regarding the expansion of three previously proposed critical habitat units and the addition of two new units.
3. Section 4(b)(2) of the Endangered Species Act (the Act) requires that the Service base the designation of critical habitat upon the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas as critical habitat, provided the exclusion will not result in extinction of the species.
4. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or

¹This analysis considers the effects of the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33058) and the revisions to the proposed critical habitat as proposed in the Federal Register January 29, 2004 (69 FR 4274).

carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is currently construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

1.1 Description of Species and Habitat²

5. *Arabis perstellata* is a perennial herb of the mustard family (Brassicaceae) threatened by alteration or loss of habitat through development (primarily home and road construction), competition with native and exotic weedy species, grazing and trampling, and timber harvesting. It inhabits shallow limestone soils on steep slopes, often found around rock outcrops, protected sites on the downslope side of tree bases, and sites of natural disturbance with little competition, such as talus slopes and animal trails. Growing up to about 32 inches tall, *Arabis perstellata* has alternate petals and small white and lavender flowers which appear from late March to early May.
6. Although varieties of this species are not recognized in recent taxonomic treatments, in the past, two varieties were distinguished based on size and degree of pubescence. The formerly recognized varieties are also geographically separated, with the larger variety (*ampla*) occurring in Tennessee and the smaller variety (*perstellata*) occurring in Kentucky. The final rule for the determination of endangered status for this species listed *Arabis perstellata* as a full species.³
7. *Arabis perstellata* is presently known from 42 populations in two separate sections of the Interior Low Plateaus Physiographic Province: the Blue Grass Section (Kentucky) and the Central Basin Section (Tennessee). The Kentucky populations occur in Franklin, Henry, and Owen Counties along the Kentucky River and its tributaries (primarily Elkhorn Creek). The Tennessee populations occur in Wilson and Rutherford Counties, along the Stones River.
8. Based on field surveys and research, the Service has identified physical and biological habitat features, referred to as primary constituent elements, that are essential for the conservation and recovery of *Arabis perstellata*. These primary constituent elements include forested areas that are relatively undisturbed, with many large trees and few openings in the canopy in plant communities typical of the Kentucky River and Stones River bluffs and slopes (*Arabis perstellata* can often be found around the bases of the larger trees at these sites) and which have:
 - The slopes of calcareous mesophytic and sub-xeric forest that are relatively undisturbed, with few openings in the canopy and several large, mature trees (such

² Information on *Arabis perstellata* and its habitat is taken from the U.S. Fish and Wildlife Service, the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33058), the revisions to the proposed critical habitat as proposed in the Federal Register January 29, 2004 (69 FR 4274), and the *Recovery Plan For The Arabis perstellata Braun*.

³ Braun's rockcress was listed on January 3, 1995 as endangered under the Endangered Species Act.

as sugar maple (*Acer saccharum*), chinquapin oak (*Quercus muhlenbergii*), hackberry (*Celtus occidentalis*), or Ohio buckeye (*Aesculus glabra*));

- An area with few introduced weedy plant species such as *Alliaria petiolata* that is able to support self sustaining populations of 50 or more individuals;
- A mesic habitat with open forest floors containing rock outcrops on moderate to steep slopes with little herbaceous cover and leaf litter accumulation with natural disturbance to allow for *Arabis perstellata* germination and seedling germination;
- Ordovician limestone, in particular the Grier, Tanglewood, and Macedonia Bed Members of the Lexington Limestone in Kentucky, and the Lebanon, Carters, Leipers, Catheys, and Bigby-Cannon Limestones in Tennessee; and
- Limestone soils such as the Fairmont Rock outcrop complexes in Kentucky and the Mimosa Rock outcrop complexes in Tennessee.

1.2 **Proposed Critical Habitat**⁴

9. Based on the most recent data for *Arabis perstellata* there are currently 42 populations in the states of Tennessee and Kentucky. All of these sites were considered for designation as critical habitat. To determine which areas should be proposed as critical habitat the Service determined whether each site has the necessary constituent elements. Because the recovery criteria call for 20 geographically distinct, self-sustaining populations, the Service is proposing to designate five populations in Rutherford and Wilson Counties in the State of Tennessee, and 17 populations in Franklin and Owen Counties in the State of Kentucky. The proposed designation includes habitat for each of these populations, and includes units ranging in size from seven to 255 acres. The average proposed unit size is 73 acres, and the median size (the size in acres where half the units are smaller and half the units are larger) is 43 acres. Approximately 810 acres of proposed habitat exists in Kentucky and 790 acres are in Tennessee. All of the proposed critical habitat areas are currently occupied by *Arabis perstellata*. Descriptions of each critical habitat unit are contained in Appendix A.

⁴ Information on *Arabis perstellata* and its habitat is taken from the U.S. Fish and Wildlife Service, the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33058), the revisions to the proposed critical habitat as proposed in the Federal Register January 29, 2004 (69 FR 4274), and the *Recovery Plan For The Arabis perstellata Braun*.

1.3 Framework for Analysis

10. The primary purpose of this analysis is to estimate the economic impact associated with the designation of critical habitat for *Arabis perstellata*.⁵ This information is intended to assist the Secretary in making decisions about whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.⁶ In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211 and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).⁷
11. This section provides the framework for this analysis. First, it defines the economic effects considered in the analysis. Second, it establishes the baseline against which these effects are measured. Third, it describes the measurement of direct compliance costs, which include costs associated with, and generated as a result of, section 7 consultations. Fourth, it identifies potential indirect economic effects of the rule resulting from (1) compliance with other parts of the Act potentially triggered by critical habitat, (2) compliance with other laws, and (3) time delays and regulatory uncertainty. Fifth, it discusses the need for an economic assessment of the benefits of critical habitat designation. Finally, the section concludes by discussing the time frame for the analysis and the general steps followed in the analysis.

1.3.1 Types of Economic Effects Considered

12. This economic analysis considers both economic efficiency and distributional effects. In the case of critical habitat designation, economic efficiency effects generally reflect the “opportunity costs” associated with the commitment of resources required to comply with the Act. For example, if the activities that can take place on a parcel of private land are limited as a result of a designation, and thus the market value of the land reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of the designation.
13. This analysis also addresses how the impacts are distributed, including an assessment of any local or regional economic impacts and the potential effects on small entities and the energy industry. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector.

⁵ This analysis considers the effects of the regulatory action as proposed in the Federal Register on June 3, 2003 (68 FR 33058) and the revisions to the proposed critical habitat as proposed in the Federal Register January 29, 2004 (69 FR 4274).

⁶ 16 U.S.C. § 1533(b)(2).

⁷ Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993; Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” May 18, 2001; 5 U.S.C. §§ 601 *et seq.*; and Pub Law No. 104-121.

14. For example, while the designation may have a relatively small impact when measured in terms of changes in economic efficiency, individuals employed in a particular sector of the economy in the geographic area of the designation may experience relatively greater effects. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

Efficiency Effects

15. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 “Regulatory Planning and Review,” Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action.⁸ In the context of this regulatory action, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of critical habitat designation and other co-extensive regulations.⁹ Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.¹⁰
16. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a landowner or manager may need to enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation represents an economic opportunity cost, because the landowner or manager’s time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.
17. Where a designation is expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency can be measured by considering changes in producer and consumer surplus in the real estate market.

⁸ Executive Order 12866, “Circular A-4,” September 17, 2003.

⁹ The term “co-extensive” is discussed in greater detail in Section 1.3.3.

¹⁰ For additional information on the definition of “surplus” and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., *A Guide to Benefit-Cost Analysis (2nd Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, available at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

18. This analysis begins by measuring reasonably foreseeable compliance costs. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the designation is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

Distributional and Regional Economic Effects

19. Measurements of changes in economic efficiency focus on the net impact of the regulation, without consideration for how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations concerning groups that may be disproportionately affected. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.¹¹ This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply distribution and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

Impacts on Small Entities and Energy Supply, Distribution and Use

20. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by critical habitat designation and other co-extensive regulations.¹² In addition, in response to Executive Order 13211 “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” this analysis considers the impacts of critical habitat on the energy industry and its customers.¹³

Regional Economic Effects

21. Regional economic impact analysis provides an assessment of the potential localized effects. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., hydroelectric power

¹¹ Office of Management and Budget, “Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice” 68 *Federal Register* 5492, February 3, 2003.

¹² 5 U.S.C. § 601 *et seq.*

¹³ Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” May 18, 2001.

generation) and the effect of that change on economic output, income, or employment in other local industries (e.g., manufacturers relying on the electricity generated). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

22. The use of regional input/output models can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the designation, compensating for a potential decrease in economic activity within the region.
23. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. These types of distributional effects, therefore, should be reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects.

1.3.2 Defining the Baseline

24. The purpose of this analysis is to measure the economic impact of compliance with the protections derived from the designation of critical habitat, including habitat protections that may be co-extensive with the listing of the species. Economic impacts to land use activities may exist in the absence of co-extensive protections. These impacts may result from, for example:
- Local zoning laws;
 - State natural resource laws; and
 - Enforceable management plans and best management practices applied by other State and Federal agencies.

Economic impacts that result from these types of protections are not included in this assessment; they are considered to be part of the “baseline.” Existing laws, regulations, and policies are described in greater detail Section 2 of this analysis.

1.3.3 Direct Compliance Costs Associated With Section 7 of the Act

25. The measurement of direct compliance costs focuses on the implementation of section 7 of the Act. This section requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent the direct compliance costs.
26. This analysis does not differentiate between consultations that result from the listing of the species (i.e., the jeopardy standard) and consultations that result from the presence of critical habitat (i.e., the adverse modification standard). Consultations resulting from the listing of the species, or project modifications meant specifically to protect to the species as opposed to its habitat, may occur even in the absence of critical habitat. However, in 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes.¹⁴ Given the similarity in regulatory definitions between the terms “jeopardy” and “adverse modification,” in practice it can be difficult to pre-determine the standard that drives a section 7 consultation. Consequently, in an effort to ensure that this economic analysis complies with the instructions of the 10th Circuit as well as to ensure that no costs of the proposed designation are omitted, the potential effects associated with all section 7 impacts in or near proposed critical habitat are fully considered. In doing so, the analysis ensures that any critical habitat impacts that are co-extensive with the listing of the species are not overlooked.

1.3.4 Indirect Costs

27. A designation may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 under the Act. The potential exists for several types of such indirect effects: three examples are discussed in this section. First, some landowners may voluntarily elect to complete a habitat conservation plan (HCP) in response to having their land designated as critical habitat. Second, some State laws may require landowners and managers to consider the effects of their actions on sensitive species and habitat. Thus, designation of critical habitat could trigger additional regulatory burden due to new information provided by the designation. Third, the consultation process may result in time delays for upcoming or ongoing projects, and the designation may foster regulatory uncertainty for prospective projects. The three most common categories of indirect effects are discussed further below.

¹⁴ *New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001).

Creation of Habitat Conservation Plans (HCPs)

28. No HCPs are proposed or currently exist within the boundaries of this proposed designation. Future HCPs within the proposed designation are unlikely because, the *Arabis perstellata* is a plant. Therefore, HCP-related costs are not an issue in this analysis. However, such costs may be a factor in other economic analyses of proposed critical habitat designations, so, this methodological discussion has been retained.
29. Under section 10(a)(1)(B) of the Act, a non-Federal entity (i.e., a landowner or local government) may develop an HCP for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.¹⁵ The HCP intends to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the Act and to meet the requirements of section 10 of the Act.
30. However, a connection may exist between the creation of HCPs and the costs these plans impose and the designation of critical habitat. The Service, being a Federal entity, must formally consider whether an HCP will jeopardize a listed species or adversely modify its designated critical habitat before approving the plan. This review process may be a direct impact under section 7 of the Act. However, in certain circumstances, the effort involved in creating the HCP and associated conservation actions may also generate indirect effects associated with the designation of critical habitat. For example, in one past instance, landowners preemptively developed HCPs in an effort to avoid having their property designated as critical habitat.¹⁶ In this case, the effort involved in creating the HCP and undertaking associated conservation actions were considered to be an effect of designation.
31. The following scenarios regarding HCP creation provide general guidance regarding the degree to which associated costs should be considered within the context of a critical habitat economic analysis:
- In cases in which an HCP existed prior to a proposed designation, the costs of developing the HCP and the added costs of management imposed by the HCP should not be considered in the analysis of the effects of the designation. These costs are appropriately considered to be part of the regulatory baseline, because their creation was driven by the listing of the species and the need to avoid take, which is prohibited under section 9 of the Act. However, in cases

¹⁵ U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning." From: <http://endangered.fws.gov/hcp/>, as viewed on August 6, 2002. Sections 9 and 10 of the Act do not apply to plants.

¹⁶ See Industrial Economics, Incorporated, *Economic Analysis of Critical Habitat Designation for the Nine Bexar County Texas Invertebrate Species*, prepared for the U.S. Fish and Wildlife Service, March 3, 2003.

where designated critical habitat overlaps with completed HCPs, the economic analysis will need to consider the cost to the Service to re-consult on the plan's impact to critical habitat and whether or not this process may result in additional conservation actions.

- In cases in which an HCP is proposed, or reasonably foreseeable absent the designation of critical habitat, the administrative costs associated with the required internal section 7 consultation should be included in the economic analysis of total section 7 costs, because the Service will need to consider the effects of the plan on designated critical habitat. In addition, if as a result of the designation additional project modifications will be recommended by the Service and incorporated into the HCP in order to avoid adversely modifying critical habitat, the costs of these project modifications should also be included in the economic analysis of critical habitat.¹⁷
- In cases in which development of one or more HCPs can be documented as being precipitated by critical habitat designation (i.e., to avoid designation or to reduce the costs of the designation), the costs of development of the HCP and the added costs of management imposed by the HCP should be included in the critical habitat economic analysis. In such cases the analysis should be presented with appropriate caveats as to the uncertainty regarding the extent to which the HCP would have existed absent critical habitat designation.

As previously stated, no current or proposed HCPs are located within the boundaries of this proposed designation.

Other State and Local Laws

32. Under certain circumstances, the designation of critical habitat may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered “but for” the designation of critical habitat,

¹⁷ Project modification costs associated with the jeopardy standard are not considered for the following reason. Section 10(a)(2)(B) of the Act requires that for the issuance of an incidental take permit, the HCP must assure that “the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.” According to the Service’s *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, “the wording of this criterion is identical to the “jeopardy” definition under the section 7 regulations (50 CFR Part 402.02)...Congress was explicit about this link, stating in the Conference Report on the 1982 ESA amendments that the Services will determine whether or not to grant a permit, “in part, by using the same standard as found in section 7(a)(2) of the ESA, as defined by the [Services’] regulations.”” (U.S. Department of the Interior and U.S. Department of Commerce, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, November 4, 1996). As a result, during the HCP process, actions undertaken to meet the jeopardy provision of section 7 are also required under section 10 of the Act. Therefore, in circumstances where an HCP is reasonably foreseeable absent the designation of critical habitat, these actions are considered to be part of the baseline of this economic analysis.

they are included in this economic analysis. For the *Arabis perstellata*, no State or local laws were identified that could potentially result in additional costs.

33. Under other circumstances, one example where such costs may be incurred is for those designations located in California. The California Environmental Quality Act (CEQA) requires that lead agencies -- public agencies responsible for project approval -- consider the environmental effects of proposed projects that are considered discretionary in nature and not categorically or statutorily exempt. Among other effects, the CEQA statutes specifically require lead agencies to consider a project's effects on rare or endangered plant and animal communities. To approve qualifying projects, lead agencies must require applicants, who are not "categorically exempt," to mitigate effects to less than significant levels for projects that are not granted a "statement of overriding considerations."¹⁸
34. In some instances, the designation of critical habitat can have an indirect effect on CEQA-related requirements. This is most likely to occur in areas where the Federal designation provides clearer information on the importance of particular areas as habitat for a listed species. In addition, applicants who were "categorically exempt" from preparing an Environmental Impact Report under CEQA may no longer be exempt once critical habitat is designated. In cases where the designation triggers the CEQA significance test or results in a reduction of categorically exempt activities, associated costs are considered to be an indirect effect of the designation.
35. In these and other cases in which costs are incurred by landowners and managers above and beyond what would be required under State or local law and policy in the absence of the designation, these costs are considered to be an indirect effect of the designation. As stated above, for the *Arabis perstellata*, no laws or regulations were identified that could potentially be triggered by the designation.

Time Delays and Regulatory Uncertainty

36. In addition to the indirect effects of compliance with other laws triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts. These can include costs due to project delays associated with the consultation process or compliance with other regulations, or, in the case of land location within or adjacent to the designation, loss in property values due to regulatory uncertainty, and loss (or gain) in property values resulting from public perceptions regarding the effects of critical habitat. These categories of potential effects are described in greater detail below.

¹⁸ Article 19 of CEQA provides a list of categorical exemptions, which are descriptions of types of projects that usually do not have a significant effect on the environment (e.g., replacement or reconstruction of existing facilities, actions taken by regulatory agencies as authorized by State law or local ordinance to assure the maintenance, restoration, or enhancement of a natural resource.) (<http://ceres.ca.gov/ceqa/flowchart/exemptions/categorical.html>, as viewed on April 21, 2003.)

Time Delays

37. Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the section 7 consultation process and/or compliance with other laws triggered by the designation. The need to conduct a section 7 consultation will not necessarily delay a project, as often the consultation may be coordinated with the existing baseline regulatory approval process. However, depending on the schedule of the consultation, a project may experience additional delays, resulting in an unanticipated extension in the time needed to fully realize returns from the planned activity. To the extent that delays result from the designation, they are considered in the analysis. Specifically, the analysis considers costs associated with any incremental time delays associated with section 7 consultation or other requirements triggered by the designation above and beyond project delays resulting from baseline regulatory processes. Time delays resulting from consultations on the *Arabis perstellata* are unlikely, because potentially affected projects will occur far enough in the future that the consultation process can be factored into planning.

Regulatory Uncertainty

38. The Service conducts each section 7 consultation on a case-by-case basis and issues a Biological Opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who need to consult with the Service under section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. However, a degree of regulatory uncertainty may persist. In some cases, this uncertainty may be incorporated by the project proponent into the costs of completing a proposed activity. For example, mining companies uncertain about potential restrictions to their activities in designated areas of critical habitat may lease mining rights at a reduced rate. Where appropriate, the analysis considers the potential costs associated with regulatory uncertainty.

Stigma

39. In some cases, the public may perceive that critical habitat designation may result in incremental changes to private property values, above and beyond those associated with anticipated project modifications and regulatory uncertainty described above. That is, the public may perceive that, all else being equal, a property that is designated as critical habitat will have lower market value than an identical property that is not within the boundaries of critical habitat. Public attitudes about the limits and costs that critical habitat may impose can cause real economic effects to the owners of property, regardless of whether such limits are actually imposed.

1.3.5 Benefits

40. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species. Such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with species conservation. Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.
41. In Executive Order 12866, OMB directs Federal agencies to provide an assessment of costs and benefits of a proposed regulatory actions.¹⁹ However, in its guidance for implementing Executive Order 12866, OMB acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations.²⁰ Where benefits cannot be quantified, OMB directs agencies to describe the benefits of a proposed regulation qualitatively. This report provides insight into the potential economic benefits of critical habitat designation based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of all of the benefits that could result from the designation. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

1.3.6 Analytic Time Frame

42. The analysis examines activities taking place both within and adjacent to the proposed designation. It estimates impacts based on activities that are “reasonably foreseeable,” including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a ten-year time frame, beginning on the day that the current proposed rule becomes available to the public. The ten-year time frame was chosen for the analysis because, as the time horizon for an economic analysis is expanded, the assumptions on which the projected numbers of projects are based become increasingly speculative. As a result, it is difficult to predict not only the numbers of projects, but also the cost estimates for the associated consultations, beyond a ten-year window. Consequently, any attempt to extend the economic analysis beyond the ten-year time window would be speculative.

¹⁹ Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993.

²⁰ U.S. Office of Management and Budget, “Circular A-4,” September 17, 2003.

1.3.7 General Analytic Steps

43. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts. The steps followed in this analysis consist of:

- Describing current and projected economic activity within and around the proposed critical habitat area;
- Identifying whether such activities are likely to involve a Federal nexus;
- For activities with a Federal nexus, evaluating the likelihood that these activities will require consultations under section 7 of the Act and, in turn, result in any modifications to projects.
- Estimating the direct costs of expected section 7 consultations, project modifications and other economic impacts;
- Estimating the likelihood that current or future activities may require additional compliance with other Federal, State, and local laws as a result of new information provided by the proposed designation;
- Estimating the likelihood that projects will be delayed by the consultation process or other regulatory requirements triggered by the designation;
- Estimating the likelihood that economic activity will be affected by regulatory uncertainty, and/or property values affected;
- Estimating the indirect costs of the designation, as reflected in the cost of compliance with State and local laws, project delays, regulatory uncertainty, and effects on property values;
- Assessing the extent to which critical habitat designation and other co-extensive regulations will create costs for small businesses as a result of modifications or delays to projects;
- Assessing the effects of administrative costs and project modifications on the supply, distribution, and use of energy; and
- Determining the benefits that may be associated with the designation of critical habitat.

44. As noted above, this analysis considers both the efficiency effects and distributional effects. It begins by considering direct compliance costs, as well as potential indirect effects, such as those effects associated with compliance with other Federal, State, and local laws,

project delays, and impacts to property values. As necessary, regional economic impacts are described, as are impacts on significantly affected markets. Impacts on small entities and energy production and consumption are discussed separately, in Section 3. Potential benefits of critical habitat are discussed qualitatively, in Section 4.

1.4 Information Sources

45. The information for this report came from communications with and review of publicly available data from the following entities:

- Fish and Wildlife Service, Cookeville and Frankfort Field Offices
- Environmental Protection Agency (EPA), Region 4
- Army Corps of Engineers (USACE), Louisville District
- Federal Energy Regulatory Commission (FERC)
- Census Bureau
- Bureau of Economic Analysis (BEA)
- Federal Highway Administration (FHWA), Tennessee and Kentucky Divisions
- Small Business Administration (SBA)
- Natural Resources Conservation Service (NRCS)
- Rural Utilities Service (RUS)
- Federal Communications Commission (FCC)
- USDA Rural Development
- Tennessee Valley Authority (TVA)
- Kentucky Nature Preserves Commission
- Kentucky Transportation Cabinet (KTC)
- Kentucky Department of Environmental Protection (KDEP)
- Kentucky Division of Forestry
- Tennessee Department of Transportation (TDOT)
- Tennessee Department of Environment and Conservation (TDEC)
- Tennessee Division of Forestry
- Tennessee Division of Natural Heritage
- Private Consulting Firms
- Affected counties

46. This section discusses the socioeconomic characteristics of areas proposed as critical habitat for *Arabis perstellata*. In addition, this section provides relevant information about regulations and requirements that may provide baseline protection to the plant and its habitat.

2.1 Socioeconomic Profile of the Critical Habitat Areas

47. This section discusses key economic and demographic information for the three counties with critical habitat areas proposed in Kentucky and Tennessee. County-level data are provided as context for the discussion of potential economic impacts due to section 7 and to illuminate trends that may influence these impacts.²¹

2.1.1 Kentucky

48. Critical habitat has been proposed for portions of Franklin and Owen Counties in north-central Kentucky. With a combined population of 58,976, these counties contain about one percent of the total population in the State (4,065,556 in 2001) and 51 percent of the total proposed designation (about 811 acres). From 1990 to 2001, Franklin and Owen Counties have grown in population by ten and 19 percent respectively (an average of 12 percent) compared to a State growth rate of 10 percent and a national growth rate of 14 percent.²² While Franklin County has exhibited the lower population growth of the two counties (ten percent), it has both the largest population (48,210) and the largest share of proposed critical habitat, with approximately 697 acres, or 44 percent. Owen County has grown at a faster rate than the State and nation, but contains less of the proposed critical habitat, accounting for approximately 114 acres (seven percent).

²¹ Population summaries are derived primarily from: U.S. Census Bureau, accessed at <http://quickfacts.census.gov/qfd/index.html> and <http://www.census.gov/epcd/cbp/view/cbpview.html>, January 2003; and county websites.

²² U.S. Census Bureau, State and County QuickFacts.

49. In 2000, Franklin and Owen Counties had a per capita personal income (PCPI) of \$29,145 and \$18,845, respectively. Together, the two counties average a PCPI of \$23,995, or roughly the State average (\$24,085) and 19 percent lower than the national average of \$29,469.²³ The most important industries in the economies of these counties are State and local government, services, and durable goods manufacturing. Agriculture does not represent a major industry in the area.

2.1.2 Tennessee

50. Critical habitat has been proposed for portions of Rutherford and Wilson Counties in north-central Tennessee. In 2001, Rutherford County had a population of 190,143, accounting for about three percent of Tennessee's population (5,740,021) and Wilson County had a population of 91,696 accounting for less than two percent of Tennessee's population.²⁴ From 1990 to 2001, Rutherford County grew at 60 percent and Wilson County grew at 35 percent, compared to a State growth rate of 18 percent and a national growth rate of 14 percent. Both Rutherford and Wilson Counties exhibited faster growth than the State and nation, with Rutherford County containing 43 percent of the proposed designation (684 acres) and Wilson County containing seven percent (106 acres).

51. Rutherford County had a PCPI of \$26,237 in 2000, which 100 percent of the State average (\$26,290) and 12 percent lower than the national average (\$29,760).²⁵ Wilson County had a PCPI of \$27,145 in 2000, which is three percent higher than the state average and nine percent lower than the national average. The most important industries in Rutherford County are service, durable goods manufacturing, and State and local government. The most important industries in Wilson County are manufacturing, construction, and retail trade.²⁶ Agriculture does not represent a major industry in the area.

2.2 Baseline Elements

52. This section provides relevant information about the regulatory elements that exist in the baseline. Where proposed activities directly affect proposed critical habitat areas, these Federal and State regulations and other voluntary measures may provide a level of protection to the species and/or its habitat even in the absence of section 7. Furthermore, these regulations may influence development patterns.

²³ U.S. Bureau of Economic Analysis, "Bearfacts: Kentucky, 1999-2000."

²⁴ U.S. Census Bureau, State and County QuickFacts.

²⁵ U.S. Bureau of Economic Analysis, "Bearfacts: Tennessee, 1999-2000."

²⁶ U.S. Census Bureau, 2001 County Business Patterns (NAICS), Wilson County.

2.2.1 Recovery Plan

53. An important component of the regulatory baseline is the Arabis Recovery Plan, published in 1997.²⁷ The Recovery Plan establishes recovery criteria for *Arabis perstellata* and proposes actions to restore and maintain *Arabis perstellata* populations. The ultimate goal of the Recovery Plan is to establish criteria and objectives that when implemented should enable the species to recover to the point that it can be removed from the Federal list of endangered and threatened wildlife and plants. While the Recovery Plan imposes no binding restrictions or obligations on landowners and managers, it serves as an important information source regarding *Arabis perstellata* habitat areas.

2.2.2 Overlap With Other Listed Species

54. Generally, if a consultation is triggered for any listed species, the consultation process will also take into account all other listed species known or thought to occupy areas on or near the project lands. As such, listing or critical habitat-related protections for other threatened or endangered species may benefit *Arabis perstellata* as well (i.e., provide baseline protection). The Service has conducted consultations on *Arabis perstellata* in combination with numerous species as indicated in Exhibit 1. However, due to the difficulty in apportioning the costs of consultations between various species as well as awareness that a consultation for *Arabis perstellata* would need to be conducted absent consultations for or involving other species, this analysis does not attempt to apportion the consultations and related costs reported by Action agencies between *Arabis perstellata* and other listed species. That is, it assumes that all future section 7 consultations within the extant boundaries of the proposed critical habitat are fully attributable to the presence of *Arabis perstellata* and its habitat.

²⁷ U.S. Fish and Wildlife Service, *Recovery Plan for Arabis perstellata Braun*, Atlanta, GA, July 1997.

Exhibit 1	
OTHER LISTED SPECIES INCLUDED IN PAST CONSULTATIONS WITH ARABIS PERSTELLATA	
Species	Status
<u>Bats</u>	
Gray bat (<i>Myotis grisescens</i>)	Endangered
Indiana bat (<i>Myotis sodalis</i>)	Endangered
<u>Plants</u>	
Leafy prairie-clover (<i>Dalea foliosa</i>)	Endangered
Pyne's ground-plum (<i>Astragalus bibullatus</i>)	Endangered
Running buffalo clover (<i>Trifolium stoloniferum</i>)	Endangered
Short's Bladderpod (<i>Lesquerella globosa</i>)	Candidate
Tennessee coneflower (<i>Echinacea tennesseensis</i>)	Endangered
<u>Mussels</u>	
Tan riffleshell (<i>Epioblasma florentina walkeri</i>)	Endangered
Yellow-blossom pearly mussel (<i>Epioblasma florentina florentina</i>)	Endangered, Experimental Population, Non-Essential
Little-wing pearly mussel (<i>Pegias fabula</i>)	Endangered
<u>Other</u>	
Nashville crayfish (<i>Orconectes shoupi</i>)	Endangered

2.2.3 Federal Statutes and Regulations

Clean Water Act (CWA)

55. *Arabis perstellata* often inhabits thinly soiled areas, and much of the proposed critical habitat is adjacent to a stream or river. Activities which affect erosion on these units may impact water quality and thus be subject to the standards of the CWA. As such, the CWA is likely to provide a measure of baseline protection to *Arabis perstellata*.
56. The purpose of the CWA is to restore the physical, biological, and chemical integrity of the waters of the United States using two basic mechanisms: 1) direct regulation of discharges pursuant to permits issued under the National Pollution Discharge Elimination System (NPDES) and Section 404 (discharge of dredge or fill materials); and 2) the Title III water quality program.²⁸

²⁸ Clean Water Act, 33 U.S.C. §1251 (1987).

57. Section 404 of the CWA prescribes a permit program for the discharge of dredged or fill material into navigable waters. Specifically, pursuant to section 404, permit applicants are required to show that they have “taken steps to avoid wetland impacts, where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through activities to restore or recreate wetlands.”²⁹ Under section 401 of the CWA (water quality), all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters are required to submit a State certification to the licensing or permitting agency. The State certification must state that the discharge complies with the requirements of sections 301, 302, 303, 306, and 307 of the CWA.

Private Stewardship Grants Program

58. The Private Stewardship Program provides grants and other assistance on a competitive basis to individuals and groups engaged in local, private, and voluntary conservation efforts that benefit federally listed, proposed, or candidate species, or other at-risk species.³⁰ Diverse panels of representatives from State and Federal government, conservation organizations, agriculture and development interests, and the science community will assess applications and make recommendations to the Secretary of the Interior, who will award the grants. Typical projects may include managing nonnative, competing species; implementing measures to minimize risk from disease; restoring streams that support imperiled species; or planting native vegetation to restore a rare plant community.

National Wild and Scenic Rivers Act

59. Under the National Rivers Inventory (NRI), a component of the National Wild and Scenic Rivers Act (NWSRA), some baseline protections may be afforded to the three proposed critical habitat units on slopes directly adjacent to Elkhorn Creek which was listed on the NRI in 1982.³¹ Federal agencies are required to avoid or mitigate adverse effects on rivers designated by the NWSRA,³² and through a presidential directive, those listed on the NRI. The NRI was created as a listing of river segments potentially eligible for Wild and Scenic designation.³³ The presidential directive provides rivers in the NRI with the same

²⁹ Section 404 of the Clean Water Act: An Overview, <http://www.epa.gov/owow/wetlands/facts/fact10.html>

³⁰ U.S. Fish and Wildlife Service, Private Stewardship Program, http://endangered.fws.gov/grants/private_stewardship.html as viewed on May 6, 2003.

³¹ Proposed critical habitat units 17, 13, and 11 are directly adjacent or in close proximity to Elkhorn Creek.

³² National Wild and Scenic Rivers Act, 16 U.S.C. §1271-1287 (1968).

³³ The NRI was created through passage of the Wild and Scenic Rivers Act of 1968. On August 2, 1979 President Jimmy Carter issued the following directive, “Each Federal agency with responsibility for administering public lands shall, as part of its ongoing land use planning and management activities and environmental review process, make

protections as those rivers designated as wild and scenic, and requires federal agencies to consult with the NPS on actions which could adversely affect rivers on the inventory. As such, this statute may influence the extent, location, and nature of future habitat-altering activities in or near the three proposed critical habitat units over the next ten years. Therefore, the listing of the Elkhorn Creek on the NRI is likely to provide some baseline protection to *Arabis perstellata*.

2.2.4 State Statutes and Regulations

The Tennessee Rare Plant Protection and Conservation Act

60. The purpose of this act is to protect, conserve, maintain, and enhance populations of rare plants in the State of Tennessee.³⁴ The act states that individuals shall not knowingly uproot, dig, take, remove, damage, destroy, possess, or otherwise disturb a listed plant species. The act designates penalties for violation of a minimum of \$100 to a maximum of \$1,000, or imprisonment of not more than six months, or both. However, the provisions of this act do not apply to private land owners, persons with the written permission of the landowner (or manager), or licensed nursery farmers. This act provides protection from activities unauthorized by the landowner in privately held units, and to the one unit in public ownership.³⁵

Natural Areas Registry

61. Both Kentucky and Tennessee manage Natural Areas Registry Programs to develop non-binding voluntary agreements with private and public landowners to protect sites with threatened and endangered species.³⁶ No rights to the property are relinquished but the landowner does agree to notify the Commission if they are interested in selling the land or the area is threatened in any way.³⁷ The landowner does not relinquish any rights to the property and agrees to protect it to the best of his or her ability.³⁸ Landowners who enroll

an assessment of whether the rivers identified in the Nationwide Inventory and which are on their lands are suitable for inclusion in the Wild and Scenic Rivers System, the agency shall, to the extent of the agency's authority, promptly take such steps as are needed to protect and manage the river and the surrounding area in a fashion comparable to rivers already included in the Wild and Scenic Rivers System.”

³⁴ The Rare Plant Protection and Conservation Act of 1985.

³⁵ Unit 14 is owned by the State of Kentucky. The remaining 21 units are in private ownership.

³⁶ Kentucky Revised Statute 146.460 (KY) and the Natural Areas Preservation Act of 1971 (TN).

³⁷ Kentucky State Nature Preserves Commission, Natural Areas Registry, <http://www.naturepreserves.ky.gov/nar.html> as viewed on February 6, 2003.

³⁸ Reggie Reeves, Director Tennessee Division of Natural Heritage, February 3, 2003.

their land in the registry program often receive a registry certificate and, if desired, other appropriate public recognition.³⁹

62. Unit 12 Camp Pleasant Branch Woods⁴⁰ (Camp Pleasant Woods State Natural Area), Unit 4 Tributary to South Benson Creek (Leeland Valley State Natural Area), Unit 6 Onans Bend (Rock Cress Woods State Natural Area), Unit 18 Scales Mountain, and Unit 20 Indian Mountain are currently in registry agreements.⁴¹ These registry agreements do not provide any additional protection to *Arabis perstellata* but may be an indicator of future conservation easements.

2.2.5 Best Management Practices

63. Best Management Practices (BMPs) are guidelines determined to be effective for resource conservation or for preventing or reducing pollution generated by nonpoint sources to meet water quality objectives. Because approximately 64 percent of proposed critical habitat units contain or are directly adjacent to a stream or river, BMPs will provide a baseline level of protection to *Arabis perstellata*.⁴²
- TVA has developed recommended BMPs for transmission line construction and maintenance activities. These BMPs require erosion and sediment control measures and include planning considerations, site re-vegetation, equipment use limitations, slope restrictions, and herbicide use restrictions.⁴³
 - FHWA has developed mandatory BMPs for erosion and sediment control. All Federally funded road construction projects must comply with either these FHWA BMPs, or with individual State BMPs if those are more stringent.⁴⁴ TDOT and KTC

³⁹ Personal communication with Deborah White, Kentucky State Nature Preserves Commission, March, 2003, and Kentucky State Nature Preserves Commission web-site. <http://www.kynaturepreserves.org/nar.html>.

⁴⁰ Personal communication with Deborah White, Heritage Branch Manager, Kentucky State Nature Preserves Commission, January 29, 2003.

⁴¹ Personal communication with David Lincicome, Rare Species Protection Program Administrator, Tennessee Division of Natural Heritage, February 25, 2003; and October 17, 2003.

⁴² U.S. Fish and Wildlife Service, *Proposed Designation of Critical Habitat for Braun's Rockcress*.

⁴³ Austin, Chris, Chris Brewster, Alicia Lewis, Kenton Smithson, Tina Broyles, and Tom Wojtalik. 1999. A guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities. Tennessee Valley Authority, Transmission/Power Supply Group.

⁴⁴ Federal Highway Administration. 1995. Best Management Practices for Erosion and Sediment Control - Final Report October 1988- June 1995. Federal Highway Administration, Washington, D.C. Eastern Federal Lands Highway Design. FHWA/FLP-94/005.

sediment control measures include re-vegetation, time of year (flow) restrictions, and design initiatives.⁴⁵

- The NRCS field offices have developed Conservation Practice Standards for stream bank and shoreline protection. Tennessee and Kentucky Divisions of Forestry have also developed similar BMPs, including the establishment and implementation of streamside management zones, erosion control measures, and practices for stream crossings and road and skid trail construction.⁴⁶ Tennessee's BMPs are voluntary, while Kentucky's BMPs are mandatory.

2.2.6 State Forestry and Transportation Programs

The Kentucky Forest Conservation Act

64. This Act requires the implementation of BMPs, which includes logger education, and provides guidelines for the harvest of timber. The act provides for civil penalties if loggers and operators fail to comply. Benefits to *Arabis perstellata* include practices which limit logging on desirable habitat, including steep slopes and along streams.⁴⁷

The Tennessee Master Logger Program

65. Tennessee offers loggers certification through the Master Logger program which includes education on voluntary BMPs. Protections afforded *Arabis perstellata* include the prohibition or restriction of forestry activities on steep slopes, including prescribed burnings,

⁴⁵ Kentucky Transportation Cabinet. 2000. Best Management Practices for Maintenance Activities in and Around Streams. Tennessee Department of Transportation. 1995. Standard Specifications For Road and Bridge Construction.

⁴⁶ NRCS, Kentucky Field Office, 2000. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.

NRCS, Tennessee Field Office, 2002. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Streambank and Shoreline Protection.

Practice Standard, Streambank and Shoreline Protection.

NRCS, Kentucky Field Office, 2002. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Forest Stand Improvement.

NRCS, Tennessee Field Office, 2002. Field Office Technical Guide, Section IV Natural Resources Conservation Service Conservation Practice Standard, Forest Stand Improvement.

Field Guide to Best Management Practices for Timber Harvesting in Kentucky (FOR-69), Kentucky Forest Practice Guidelines for Water Quality Management, Silviculture BMPs and Streams and Other Waters BMPs of the Kentucky Agriculture State Water Quality Plan. Guide to Forestry Best Management Practices, Tennessee Department of Agriculture, Division of Forestry, 1993.

⁴⁷ Kentucky Revised Statute KRS 149.330 to 149.355.

establishment of stream side management zones, and guidelines for road and skid trail construction.⁴⁸

Forest Stewardship Programs

66. Under the Forestry Title of the 1990 Farm Bill, Kentucky and Tennessee provide management planning assistance to landowners who are interested in conserving and protecting their forested lands. These voluntary Stewardship Plans are tailored to meet the primary objectives of the landowner in such areas as wildlife, aesthetics, recreation, and forestry management. Professionally developed conservation management plans may afford *Arabis perstellata* some protection on the 19 proposed critical habitat units that are privately owned.

State Transportation Programs

67. KTC BMPs include baseline protections to *Arabis perstellata* when projects occur in or near rivers and streams, for example sediment control measures, re-vegetation recommendations and design initiatives.⁴⁹

2.2.7 Conservation Agreements

Conservation Easements

68. A conservation easement is the sale or donation of certain property rights while retaining ownership of the property, these agreements are also known as deed restrictions. Conservation easements are binding, restrict the activities and property rights of the landowner and can provide more protection to *Arabis perstellata* than critical habitat. A conservation easement for Unit 5 Davis Branch is held by the Kentucky State Nature Preserves Commission. Unit 19 Sophie Hill is a potential future conservation easement site.⁵⁰ Recently, programs which include conservation easements have demonstrated some success in affording protection to *Arabis perstellata*. For example, in October, 2002, a local resident donated a conservation easement to the commission covering 112 acres of forested land along the Kentucky River specifically to help preserve *Arabis perstellata*.⁵¹

⁴⁸ Tennessee Division of Forestry. <http://www.state.tn.us/agriculture/forestry/tdfml.html>.

⁴⁹ Kentucky Transportation Cabinet. 2000. Best Management Practices for Maintenance Activities in and Around Streams.

⁵⁰ The Tennessee Division of Natural Heritage would like to acquire some of these units in Tennessee and enroll them in the Natural Areas Program as a Designated State Natural Area. One of the program's goals is perpetual and binding agreements for all Federally listed species in Tennessee. The current emphasis is on designating areas that are privately owned. Reggie Reeves, Director Tennessee Division of Natural Heritage, February 3, 2003.

⁵¹ Scott, Ron. Natural Areas Protected with New Approach. Land, Air, and Water Magazine. The Kentucky Nature Preserves Commission. Winter 2003, Vol 14, No.1.

Management Agreement

69. Unit 10 Strohmeiers Hills is under a management agreement with the Kentucky Natural Heritage Program for the recovery of *Arabis perstellata*.⁵² Management activities include activities to control sediment and noxious weeds. The agreement is non-binding and does not restrict the property owners activities or property rights. Thus, the only protection granted by the management agreement is habitat enhancement.

Wildlife Management Areas

70. Unit 14 Clements Bluff is part of the Kentucky River Wildlife Management Area owned by the State of Kentucky and managed by the Kentucky Department of Fish and Wildlife Resources. This wildlife management area provides baseline protection by preserving *Arabis perstellata* sites.

⁵² Personal communication with Deborah White, Heritage Branch Manager, Kentucky State Nature Preserves Commission, January 29, 2003.

71. The previous two sections introduced the geographic areas in which the Service is proposing to designate critical habitat for *Arabis perstellata*, the socioeconomic profile of these areas, and general trends associated with population, economic, and urban growth. These sections also outlined the baseline level of protection afforded *Arabis perstellata* and its habitat.

72. This section begins with a summary of the categories of economic impact associated with section 7 implementation for *Arabis perstellata*. This section then identifies the current land uses in or near proposed critical habitat that may be affected by section 7 implementation for *Arabis perstellata*. Importantly, these estimates include the effects of section 7 implementation for all activities associated with the proposed critical habitat area. As such, this section does not distinguish impacts that may be attributable co-extensively to the listing of *Arabis perstellata* from those impacts attributable solely to the critical habitat designation.

3.1 Categories of Economic Impacts Associated with Section 7 Implementation

73. The following section provides an overview of the categories of economic impacts that are likely to arise due to the implementation of section 7 in the geographic area proposed as critical habitat for *Arabis perstellata*.

3.1.1 Technical Assistance

74. Frequently, the Service responds to requests for technical assistance from Federal and State agencies, local municipalities, and private landowners and developers with questions regarding whether specific activities may affect a listed species or its critical habitat. Technical assistance costs represent the estimated economic costs of informational conversations between these entities and the Service regarding such potential effects. Most likely, such conversations will occur between municipal or private property owners and the Service regarding areas designated as critical habitat or lands adjacent to critical habitat.

The Service's technical assistance activities are voluntary and occur in instances where a Federal nexus does not exist.

75. Estimates of the cost of technical assistance efforts were developed from a review and analysis of historical technical assistance records from the Service's Cookeville and Frankfort field offices. Cost figures were based on an average level of effort for technical assistance efforts (ten minutes) and multiplied by the appropriate labor rate for staff from the Service.⁵³

3.1.2 Section 7 Consultations

76. Section 7(a)(2) of the Act requires Federal agencies (Action agencies) to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. In some cases, consultations will involve the Service and another Federal agency only, such as the USACE. Often, they will also include a third party involved in projects on non-Federal lands with a Federal nexus, such as private landowners conducting activities that require a Federal permit. In addition, Action agencies may engage in programmatic consultations to develop strategies to consider impacts to *Arabis perstellata* and its habitat at the program level, rather than at the individual project level. For example, EPA conducts programmatic consultations with the Service to consider endangered and threatened species when reviewing State water quality standards.
77. During a consultation, the Service, the Action agency, and if applicable, the third party applying for Federal funding or permitting communicate in an effort to minimize potential adverse effects to the species and/or to the proposed or designated critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, the potential effects to the species and designated critical habitat associated with the proposed activity, and the parties involved.
78. Section 7 consultations with the Service may be either informal or formal. *Informal consultation*, which consists of discussions between the Service, the Action agency, and the third party concerning an action that may affect a listed species or its designated critical habitat, is designed to identify and remove potential impacts at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that the proposed action is likely to adversely affect a listed species or designated critical habitat in ways that cannot be resolved through informal consultation. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants. The costs of these efforts are an important component of the impacts assessment.

⁵³ Based on data from the federal government general schedule rates, Office of Personnel Management, 2002, and records from the Service's Cookeville field office.

79. Estimates of the Service's cost of formal and informal individual consultations were developed from a review and analysis of historical section 7 files from the Service's Cookeville field office. Estimates of the cost of formal and informal individual consultations for all other entities were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. Cost figures were based on an average level of effort for consultations of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies. Estimates take into consideration the level of effort of the Service, the Action agency, and the applicant during both formal and informal consultations, as well as the varying complexity of consultations. Informal consultations are assumed to involve a low to medium level of complexity. Formal consultations are assumed to involve a medium to high level of complexity.
80. Section 7 consultation costs include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and in some cases, developing a biological assessment or biological opinion. Biological assessments (BAs) are prepared to determine whether proposed projects, and in some cases their alternatives, are likely to adversely affect the listed species or designated critical habitat. Biological assessments include a survey of the literature, a detailed discussion of the effects of the action and listed species or critical habitat, and findings based on this information.
81. Per-unit costs associated with formal consultations, informal consultations, and technical assistance calls are presented in Exhibit 2. Unless otherwise stated, this table is used to develop total administrative costs for consultations associated with activities within proposed critical habitat for *Arabis perstellata*.

Exhibit 2					
ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS FOR ARABIS PERSTELLATA (PER EFFORT) ^a					
Critical Habitat Impact	Scenario	Service ^b	Action Agency	Third Party ^c	Biological Assessment ^e
Technical Assistance	Low	\$10	N/A	\$600	\$0
	High	\$10	N/A	\$1,500	\$0
Informal Consultation ^d	Low	\$30	\$1,300	\$1,200	\$0
	High	\$190	\$3,900	\$2,900	\$5,100
Formal Consultation	Low	\$760	\$3,900	\$2,900	\$5,100
	High	\$4,540	\$6,500	\$4,100	\$5,100
^a	Low and high estimates primarily reflect variations in staff wages and time involvement by staff.				
^b	Service estimates are based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, and records from the Service's Cookeville field office.				
^c	A third party is assumed to bear the cost of a biological assessment. When no third party is involved, the Action agency bears the cost, and the bearing of this cost varies from agency to agency.				
^d	Internal consultations are approximately the same cost as informal consultations, unless indicated otherwise. For internal consultations, the Service bears the costs normally borne by both the Service and the Action agency.				
^e	Biological assessment costs are based on information provided by Mike Hardin, KTC, February 5, 2003.				
Sources: IEC analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service field offices across the country, and communications with Biologists in the Service's Cookeville Field Office.					

3.1.3 Project Modifications

82. The section 7 consultation process may result in some modifications to a proposed project. Projects may be modified in response to voluntary conservation measures suggested by the Service during the *informal* consultation process in order to avoid or minimize impact to a species and/or its habitat, thereby removing the need for formal consultation. Alternatively, *formal* consultations may involve modifications that are agreed upon by the Action agency and the third party and included in the project description as avoidance and minimization measures, or included in the Service's biological opinion on the proposed action as discretionary conservation recommendations to assist the Action agency in meeting their obligations under section 7(a)(1) of the Act.⁵⁴
83. In some cases, the Service may determine that the project is likely to jeopardize the continued existence of the species and/or destroy or adversely modify its designated critical habitat. In these cases the Service will provide the Action agency with reasonable and

⁵⁴ Section 7(a)(1) requires Federal agencies to utilize their authorities to further the purposes of the Act by carrying out programs for the conservation of listed species.

prudent alternatives (RPAs) that will keep the action below the thresholds of jeopardy and/or adverse modification. An RPA is an alternative that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the Action agency's legal authority and jurisdiction; and (3) is economically and technologically feasible. These RPAs are typically developed by the Service in cooperation with the Action agency and, when applicable, the third party. Alternatively, the Action agency can develop its own RPAs, or seek an exemption for the project. All of these project modifications have the potential to represent some cost to the Action agency and/or the third party. In certain instances, these modifications can lead to broader regional economic impacts.

3.1.4 Regional Economic Impacts

84. The consultation process and related project modifications could directly affect the operations of entities in some industries (e.g., agriculture producers and residential developers), with secondary impacts on the suppliers of goods and services to these industries, as well as purchasers of productions from these industries. For example, modified or decreased grazing and haying activities could affect businesses providing agricultural equipment and supplies. Thus, project modifications or other restrictions that engender cost and revenue impacts involving commercial enterprises can have a subsequent detrimental effect on other sectors of the local economy, especially when the affected industry is central to the local economy. Industries within a geographic area are interdependent in the sense that they purchase output from other industries and sectors, while also supplying inputs to other businesses. Therefore, direct economic effects on a particular enterprise can affect regional output and employment in multiple industries.
85. There are many methods available for conducting economic impact assessments, depending on the particular policy interests and goals of the economic analysis. Use of an input-output (I-O) model, such as IMPLAN, to gauge the direction and magnitude of regional economic impacts is useful in situations where the critical habitat designation may affect the commercial economy of a specific geographic area. However, I-O modeling is not appropriate for all economic impact analyses associated with critical habitat areas and can result in misinterpretations and biased conclusions if used inappropriately. I-O models are appropriate when the following factors are present: (1) economic impacts of the proposed designation are substantial and clearly defined in the analysis; (2) impacts have a clear effect on one industry or groups of industries prevalent in the geographic region; and (3) substitution possibilities for the focal economic input or activity are not widely available.
86. A regional economic analysis was not performed for this economic analysis due to the small number of activities affected by this designation. While increased administrative costs are projected, only minimal project modifications are forecasted to result from the designation.

3.1.5 Regulatory Uncertainty

87. The outcomes of section 7 consultations are by their nature uncertain. The Service conducts each consultation on a case-by-case basis and issues Biological Opinions and associated project modification requirements based on species-specific and site-specific considerations. While some differences in project modification requirements are clearly linked to habitat quality and other determinable factors, an element of uncertainty remains. The costs estimated in this section considered the economic costs associated with the typical expected project modifications. While these represent the range of economic costs, costs for individual projects will fluctuate above and below this level. This analysis does not quantify uncertainty beyond estimating the likely upper bound of costs for these typical project modifications.

3.2 Activities Potentially Affected by Section 7

88. Several Action agencies carry out, permit, or fund activities and projects in or adjacent to proposed critical habitat areas. These activities may lead to section 7 consultation with the Service, and in some cases specific projects may be modified in order to protect *Arabis perstellata* and/or its habitat. This analysis predicts that forestry will be the activity most impacted by section 7 consultation, followed by utilities, road construction and maintenance, and commercial development.
89. This section examines and quantifies the potential effects of section 7 on these activities. The discussion includes a description of the activity, how the activity would be affected, the number of expected section 7 informal and formal consultations and the associated administrative and project modification costs by activity and by unit in the proposed critical habitat area. The section also identifies and discusses those activities unlikely to incur section 7 impacts. These activities include residential development and agriculture. Because of proprietary information, we were not able to predict whether wireless communication towers would be sited on the proposed designation, requiring section 7 consultation.

3.2.1 Forestry

90. Forestry activities that could potentially affect *Arabis perstellata* include timber harvesting, timber stand improvements, and wildlife management practices. Because 21 of the 22 proposed units are privately owned, and timber harvest is not federally funded or permitted, a federal nexus for timber harvest does not exist. Therefore, section 7 consultations regarding timber harvest projects are not likely to occur over the next ten years.⁵⁵ While timber harvest is a potential threat to *Arabis perstellata*, given the severity

⁵⁵ Personal communication with Tim Sheehan, KY Division of Forestry, and Reggie Reeves, Tennessee Division of Natural Heritage, 2003.

of slopes and forest types in the proposed critical habitat designation, the Kentucky Division of Forestry describes the threat as low.⁵⁶

91. Timber stand improvement is a forest management activity practiced in the counties encompassing the proposed critical habitat designation; thus, the possibility of this activity impacting *Arabis perstellata* does exist. Private landowners are not required to develop timber stand improvement plans; however, the NRCS does provide technical and financial assistance to private landowners regarding these plans under its Forest Stand Improvement Practice, which is a component of the Environmental Quality Incentives Program (EQIP). Because a federal nexus does exist, the NRCS is required to consult with the Service on timber stand improvements plans.
92. The Kentucky NRCS anticipates one to five informal consultations with the Service regarding timber stand improvement plans over the next ten years. Up to five of these will require a BA. The total administrative cost associated with forestry will range from \$2,530 (one informal consultation) to \$60,450 (five informal consultations).⁵⁷ Project modifications will be unlikely, as the NRCS would withdraw assistance if the Service determines that a project would have an adverse effect on threatened or endangered species.⁵⁸ However, the value of the lost timber stand improvement assistance is an opportunity cost attributable to section 7. The total value of technical and financial assistance provided by NRCS to the individual landowner for timber stand improvements is estimated at \$2,878.⁵⁹ Based on this estimate, the total opportunity cost associated with timber stand improvements will range from \$0 to \$14,390.
93. The Tennessee NRCS does not expect to conduct any direct activities with private landowners for timber management activities over the next ten years.⁶⁰

⁵⁶ The forest types include ohio buckeye, hackberry, chinquapin oak, and sugar maple. Personal communication with Tim Sheehan, KY Division of Forestry, 2003.

⁵⁷ See Exhibit 2.

⁵⁸ Personal communication with Mason Howell, NRCS (KY), 2003.

⁵⁹ Under a similar but now rescinded program, NRCS spent an average of 22 hours per landowner for technical assistance in timber stand improvements. At an average government rate of \$69/hr., the value of this technical assistance is \$1,386 per landowner (Office of Personnel Management, <http://www.opm.gov/oca/02tables/gs.htm> and http://www.opm.gov/oca/02tables/gs_h.htm, February, 2002). In 2001, NRCS spent a total of \$22,400 statewide for timber stand improvements for 15 landowners or an average financial assistance of \$1,360 per landowner. Personal communication with Deena Wheby, NRCS (KY), 2003.

⁶⁰ Personal communication with Joseph Paugh, Tennessee NRCS, April 2, 2003; Personal communication with Christy Luna, District Conservationist, Lebanon Field Office, Tennessee NRCS, October 9, 2003; Comment letter from James W. Ford, State Conservationist, Tennessee NRCS, June 16, 2003.

3.2.2 Utilities

94. Utility activities involve the construction and maintenance of electrical transmission, gas, sewer, and water systems. Typical projects may include the construction of new water treatment facilities or pipelines, or the clearing of brush from transmission line corridors. In some municipalities, including the city of Frankfort which has five proposed critical habitat units, new residential or commercial construction must be connected to the city water and sewer system, which often requires the construction of new water and sewer lines.⁶¹ Historically, two utility projects have undergone informal consultation with the Service; the Action agency for these consultations was USDA Rural Development, and no project modifications were required. While there may be future utility projects in the counties that contain proposed critical habitat for *Arabis perstellata*, no specific information was available on projects involving a federal nexus in Kentucky, and no consultations are expected for utility projects in the state.⁶²
95. In Rutherford County, Tennessee, TVA may consult with the Service regarding the construction and maintenance of transmission lines if the activity occurs in or adjacent to the three units of proposed critical habitat. The TVA typically follows environmental quality protection specifications for transmission line construction and works with project engineers to avoid and minimize impacts to threatened and endangered species. TVA Right-of-Way Program Administrators develop vegetation clearing plans specific to each line segment.
96. Vegetation management activities are required on three or five year schedules. Potential transmission line activities which can adversely affect *Arabis perstellata* include improvement of transmission lines and maintenance of transmission lines. TVA policy and principles on the environment requires the minimization of effects of operations on the environment, and compliance with environmental laws and regulations.⁶³ TVA BMPs for transmission line construction and maintenance activities require erosion and sediment control measures including planning considerations, site re-vegetation, equipment use limitations, slope restrictions, and herbicide use restrictions.⁶⁴ Based on existing and proposed transmission lines in the region, the TVA anticipates two or three informal consultations over the next ten years regarding *Arabis perstellata* and its habitat in Unit 20

⁶¹ Personal communication with Vickie Sewell and Jim Hillman, Franklin County Officials. February 19, 2003.

⁶² Personal communication with: Vickie Sewell and Jim Hillman, Franklin County Officials, February 19, 2003, Robert Arvedlund, February 25, 2003, and Chris Westbrook, USDA Rural Development, March 13, 2003.

⁶³ TVA. Principles and Practices Manual. Revised 2002.
<http://www.tva.com/foia/readroom/policy/prinprac/index.htm>, as viewed on February 19, 2003.

⁶⁴ Austin, Chris, Chris Brewster, Alicia Lewis, Kenton Smithson, Tina Broyles, and Tom Wojtalik. 1999. A guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities. Tennessee Valley Authority, Transmission/Power Supply Group.

Indian Mountain.⁶⁵ The total administrative costs associated with these consultations ranges from \$5,060 to \$36,270.⁶⁶ Typical project modifications include the use of manual maintenance techniques instead of broadcast herbicide spraying, and costs may range from \$2,000 to \$5,000 per project.⁶⁷ The total project modification costs associated with transmission line activities will range from \$4,000 to \$15,000.

3.2.3 Road Construction and Maintenance

97. Road construction and maintenance has been identified as a potential threat to *Arabis perstellata*, as some road construction and maintenance activities may occur within the proposed critical habitat area during the next ten years.⁶⁸ Potential road projects which can adversely affect *Arabis perstellata* include: construction and maintenance of bridges, expansion or improvement of the existing public road network, removing rock fall hazards, and construction or improvement of private roads. Since 1995 there have been four informal consultations which involved *Arabis perstellata*.⁶⁹ Each informal consultation included a biological assessment.⁷⁰
98. The typical Federal nexuses for road construction and maintenance activities are funding from the FHWA for KTC or TDOT projects, and/or CWA §404 permitting from the USACE for projects with the potential to discharge dredged or fill material into navigable waters of the United States, and/or 26(a) permitting from the TVA for projects in the Tennessee River watershed that may impact navigation, flood control, or public lands. While many roads exist adjacent to the proposed critical habitat, only KTC anticipates future section 7 consultations with the Service. KTC predicts one formal consultation with the service in the next ten years. The future road project will involve Unit 14, Clements Bluff. Neither the Kentucky Division of the Federal Highway Administration, nor TDOT, anticipate any consultations with the Service during the next ten years.⁷¹ The total

⁶⁵ Personal communication with Charles Nicholson, TVA, March 16, 2003; October 16, 2003; and October 22, 2003.

⁶⁶ See Exhibit 2. TVA is assumed to bear the costs of the Action agency and the third party since the level of effort and time required to complete the consultation will not be reduced by the absence of a third party.

⁶⁷ Personal communication with Charles Nicholson, TVA, March 16, 2003.

⁶⁸ Personal communication with Service Personnel, Cookeville Field Office, January 28, 2003.

⁶⁹ Based on consultation history provided by the Service's Cookeville, Tennessee Field Office.

⁷⁰ The estimated administrative cost of these past informal consultations is \$8,500 to \$14,900 each, or \$34,000 to \$59,600 total.

⁷¹ Personal communication with Mike Hardin, Kentucky Transportation Cabinet, February 4, 2003. Kentucky Transportation Cabinet 2002 Six Year Highway Plan. Personal communication with Olivia Michael, Federal Highway Administration, Kentucky Division, February 10, 2003. Personal communication with Lilah Miller, Tennessee Department of Transportation, February 7, 2003. Personal communication with Mark Doctor, Federal Highway

administrative costs associated with this formal consultation will range from \$12,660 to \$20,140.⁷² Project modifications are likely to include project design restrictions to avoid habitat. The project is three to five years away from construction, and design restrictions are unlikely to add any additional costs to the project.⁷³

3.2.4 Development

99. Residential and commercial development have been identified as a potential threat to *Arabis perstellata* during the next ten years.⁷⁴ Much of the proposed critical habitat is on steep slopes adjacent to streams or rivers, with several units near major roadways. The tops of these slopes may be desirable locations for home development. Because 19 of the 20 proposed units are on private property, and development is not federally funded or permitted, there is no federal nexus for consultations under section 7, and there are no foreseeable formal or informal consultations or project modifications for this activity.
100. Commercial development has occurred in recent years and is likely to continue in the counties in which critical habitat for *Arabis perstellata* has been proposed. The typical federal nexus for development activities is CWA § 404 permitting from USACE for projects with the potential to discharge dredged or fill material into navigable waters. Since 1995, there have been four informal consultations for commercial development projects, none of which required project modifications.⁷⁵ USACE expects one to three projects over the next ten years which may require an informal consultation, and no project modifications.⁷⁶ The total administrative costs associated with the development range from \$2,530 to \$36,270.⁷⁷
101. Reductions in property value may also occur through public perception (stigma) that the designation will restrict land uses, inhibit private development, or cause project delays. Such loss in property value can be experienced for as long as such perception persists. However, this effect is likely to be temporary in nature as the uncertainties and perceptions, particularly regarding the scope of protection afforded the species over strictly private activities, dissipate and/or become clarified over time. Note, some or all of the units may

Administration, Tennessee Division, February 13, 2003. Personal communication with Matt Richards, Biologist, Environmental Planning and Permits Division, Tennessee Department of Transportation, November 12, 2003.

⁷² See Exhibit 2.

⁷³ Third Rock Consultants, February 19, 2003.

⁷⁴ Personal communication with Service personnel, Cookeville Field Office, January 28, 2003.

⁷⁵ Includes one project for a military facility, barracks, and equipment storage facility.

⁷⁶ Personal communication with LeeAnne Devine at USACE, March 12, 2003.

⁷⁷ See Exhibit 2.

experience increases in property value due to a perception of restricted development, as preservation of open space can have a positive effect on property value.

3.2.5 Wireless Communications Tower Construction

102. The top of the slopes which *Arabis perstellata* inhabits may be desirable locations for siting future wireless communications towers, construction of which requires a license from the FCC. While the initiation of the siting review process for potential towers is delegated by the FCC to the applicant or licensee, an informal consultation is initiated with the Service if a listed species is present at the site. If the Service determines a project “may affect” *Arabis perstellata*, the FCC asks the applicant to perform a BA and the FCC initiates a formal consultation with the Service. The majority of consultations are resolved at the informal level, although if listed species are present or adjacent to the proposed tower site, the FCC generally initiates a formal consultation with the Service.⁷⁸ Consultations are not expected regarding *Arabis perstellata* or its critical habitat for this activity.

3.2.6 Agriculture

103. Agricultural activities have been identified as a potential threat to *Arabis perstellata*.⁷⁹ Most agriculture activities on private land generally do not constitute a Federal nexus unless some type of Federal funding is involved or a Federal permit is required. However, agricultural activities can have a Federal nexus if a rancher or farmer receives a loan or grant from the Federal Farm Service Agency (FSA), or receives a grant from the NRCS, such as through the WHIP or EQIP programs.⁸⁰ The potential to utilize the WHIP program to create openings in *Arabis perstellata* critical habitat is considered low.⁸¹ For the traditional classes of livestock (beef cattle, dairy cattle, and horses) the potential for informal consultation through the EQIP program is also considered low. However, if the landowners are involved in goat production formal consultations may be required, the potential for consultation is low as long as goat production remains primarily on open pastures. Staff at the Tennessee NRCS believe the likelihood of future consultations is low, given that no consultations have occurred in the past, and they do not know of specific

⁷⁸ Personal communication with Frank Stillwell - Attorney for the Federal Communications Commission, 2003.

⁷⁹ Personal communication with Service personnel, Cookeville Field Office, January 28, 2003.

⁸⁰ Environmental Quality Incentives Program (EQIP) - Provides technical and financial assistance for the installation or implementation of structural and management conservation practices on agricultural land to farmers and ranchers who face particular land and water quality threats. Wildlife Habitat Incentives Program (WHIP) - Provides technical and financial assistance to landowners to develop upland, wetland, riparian, and aquatic habitat areas on their property.

⁸¹ Comment letter from James W. Ford, State Conservationist, Tennessee NRCS, June 16, 2003; Personal communication with Mike Zeman, Biologist, Nashville State Office, Tennessee NRCS, October 15 and 20, 2003; Personal communication with Christy Luna, District Conservationist, Lebanon Field Office, Tennessee NRCS, October 9, 2003.

projects that will require consultation in the future.⁸² The Kentucky NRCS does not anticipate any consultations for the next ten years regarding *Arabis perstellata* and its habitat.⁸³

3.3 Estimated Cost of Section 7 Technical Assistance

104. Cost estimates for technical assistance are based on recent experience at the Service's Cookeville Field Office. Costs associated with these efforts include the opportunity cost of Service personnel time, as well as third party staff costs. Per-effort costs associated with technical assistance are presented in Exhibit 3.

105. Based on the number of technical assistance efforts specifically addressing *Arabis perstellata* during the past five years, this analysis assumes that the Service will receive six requests per year. On average, technical assistance efforts required 10 minutes of Service personnel time, and Service staff time is estimated to cost \$63 per hour. Therefore, on average technical assistance requests cost approximately \$10 per request. Assuming technical assistance requests continue at the historic rate, the annual cost to the Service for technical assistance is expected to be \$60, or \$600 over the next ten years. Add to this the cost to third parties, and the total cost of technical assistance efforts over the next ten years is estimated to range from approximately \$37,000 to \$91,000. Most of these costs will be incurred by third parties such as State agencies and private landowners.

3.4 Estimated Total Costs of Section 7

106. The cost estimates presented in Exhibit 3 are an indication of the total costs that may be associated co-extensively with future section 7 consultations on *Arabis perstellata* and its designated critical habitat over the next ten years. They are a function of the number of consultations as detailed in Exhibit 3, plus the project modifications described in Section 3.2. They represent costs likely to be incurred by the Service, Action agencies, and third parties for activities having a Federal nexus, which would require consultation under section 7 of the Act.

107. Based on this analysis, the total estimate of section 7 costs associated with the proposed critical habitat designation for *Arabis perstellata* ranges from \$65,000 to \$272,000 over ten years. Approximately 89 percent to 94 percent of these costs are administrative in nature, while six percent to 11 percent represent direct costs of modifying projects, given the project modifications described in Section 3.2. As discussed in Section 3.1.4, because a

⁸² Ibid.

⁸³ Personal communication with Mason Howell, NRCS KY, 2003.

small number of activities are affected by section 7, and the associated project modification costs are minimal, section 7 will have no measurable impacts on the regional economy.

108. Approximately 51 percent to 69 percent (\$44,000 to \$140,000) of the section 7 costs (administrative, project modification and technical assistance) will be borne by third parties. The majority of these third party costs consist of technical assistance (\$36,000 to \$90,000), followed by administrative costs of consultation (\$8,000 to \$36,000) and then project modification/opportunity costs (up to approximately \$14,000). The remaining section 7 costs will be borne by Federal agencies, including the Service, TVA, NRCS, and USACE. Approximately 29 percent to 46 percent (\$18,000 to \$126,000) will be administrative and operational costs (including project modifications incurred by TVA) borne by Federal agencies carrying out projects (forestry, utilities, development, and transportation), and approximately two to three percent (\$1,000 to \$7,000) will be administrative costs to the Service from engaging in section 7 consultation.

109. As noted above, Exhibit 3 summarizes the estimated total co-extensive costs associated with section 7 implementation for *Arabis perstellata* over a ten year time frame.

Exhibit 3

**TOTAL ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL ADMINISTRATIVE REQUIREMENTS
AND PROJECT MODIFICATIONS FOR LAND USE ACTIVITIES FOR ARABIS PERSTELLATA,
ROUNDED TO NEAREST \$1,000 (TEN YEARS)**

Activity	Maximum Future Consultations (Formal/ Informal)	Informal Consultation Costs	Formal Consultation Costs	Project Modification/ Opportunity Costs	Total Costs
Forestry	0/5	\$3,000 to \$60,000	\$0	\$0 to \$14,000	\$3,000 to \$74,000
Utilities	0/3	\$5,000 to \$36,000	\$0	\$4,000 to \$15,000	\$9,000 to \$51,000
Development	0/3	\$3,000 to \$36,000	\$0	\$0	\$3,000 to \$36,000
Road Construction and Maintenance	1/0	\$0	\$13,000 to \$20,000	\$0	\$13,000 to \$20,000
Wireless Communications Tower Construction	0/0	\$0	\$0	\$0	\$0
Agriculture	0/0	\$0	\$0	\$0	\$0
Subtotal					\$28,000 to \$181,000
Total Technical Assist.					\$37,000 to \$91,000
Total	1/11	\$11,000 to \$132,000	\$13,000 to \$20,000	\$4,000 to \$29,000	\$65,000 to \$272,000

Source: Based on personal communication with USFWS Biologists, USACE, TVA, Kentucky NRCS, and KTC personnel.

110. The cost estimates presented in Exhibit 4 are a function of the estimated number of consultations and project modifications associated with activities affecting *Arabis perstellata*, along with the per effort costs outlined in Exhibit 2, presented by critical habitat unit. Project locations were only identified for transportation and utility activities, three or four of the total consultations; a formal road consultation in Unit 14 Clements Bluff and two or three informal consultations for power transmission lines in Unit 20 Indian Mountain. The remaining two to seven consultations were allocated among the units by land use type.⁸⁴ Because the number of units far exceeds the number of unallocated consultations, Exhibit 4 presents a possible range of costs, by unit, assuming the consultations will either not occur (low estimate) or the maximum number of possible consultations will occur in a particular unit (high estimate). This allows the decision maker to understand the range of possible costs for any one unit. While the Service anticipates six annual technical assistance efforts, or 60 during the next ten years, due to uncertainty about the location of the technical assistance efforts, technical assistance costs are not allocated among the 22 proposed critical habitat units.

⁸⁴As defined in the *Frankfort/Franklin County Comprehensive Plan*, January, 2001. Personal communication with Aaron Holmes, Assistant Planner, Rutherford Planning Office, February 27, 2003.

Exhibit 4						
TOTAL ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL SECTION 7 CONSULTATION COSTS FOR ARABIS PERSTELLATA BY UNIT ROUNDED TO THE NEAREST \$1,000 (TEN YEARS)						
Unit	Description	TSI	Develop.	Utilities	Roads	Possible Range
20	Indian Mountain			X		\$9,000 to \$51,000
8	Hoover Site	X	X			\$0 to \$27,000
14	Clements Bluff				X	\$13,000 to \$21,000
10	Strohmeiers Hills	X				\$0 to \$15,000
3	Red Bridge Ridge	X				\$0 to \$15,000
4	Trib to South Benson Ck	X				\$0 to \$15,000
5	Davis Branch	X				\$0 to \$15,000
6	Onans Bend	X				\$0 to \$15,000
7	Shadrock Ferry Road	X				\$0 to \$15,000
9	Long Site	X				\$0 to \$15,000
11	US 127	X				\$0 to \$15,000
12	Camp Pleasant Branch	X				\$0 to \$15,000
13	Saufley	X				\$0 to \$15,000
17	Backbone North	X				\$0 to \$15,000
1	Sky View Drive		X			\$0 to \$12,000
2	Benson Valley Woods		X			\$0 to \$12,000
19	Sophie Hill		X			\$0 to \$12,000
15	Monterey U.S. 127					\$0
16	Craddock Bottom					\$0
18	Scales Mountain					\$0
21	Grandfather Knob					\$0
22	Versailles Knob					\$0
Note: TSI is acronym for Timber Stand Improvement. Source: Exhibit 3						

111. Exhibit 5 presents the present value of total costs summarized in Exhibit 3, as well as annualized costs associated with section 7 implementation for *Arabis perstellata*. Guidance provided by the OMB specifies the use of a rate of seven percent, reflecting the social opportunity cost of capital (measured by the before-tax rate of return for private

investment). In addition, OMB recommends sensitivity analysis using other discount rates. One commonly applied rate is three percent, reflecting a social rate of time preference (estimated using average rates on long-term Treasury bonds).⁸⁵ This analysis presents results using both of these rates.

Exhibit 5	
PRESENT AND ANNUALIZED VALUE OF COSTS ASSOCIATED WITH SECTION 7 FOR ARABIS PERSTELLATA ROUNDED TO THE NEAREST \$1,000 (TEN YEARS)	
	Total Co-Extensive Costs
Nominal value of total section 7 costs	\$65,000 to \$272,000
Present Value (7% discount rate)	\$47,000 to \$209,000
Annualized over ten years	\$7,000 to \$30,000
Present Value (3% discount rate)	\$55,000 to \$233,000
Annualized over ten years	\$8,000 to \$33,000
Note: Present value and annualized cost estimates are based on an assumption that consultation and project modification costs will be distributed as described in Section 3.2. Technical assistance efforts are distributed evenly over a ten year period.	

3.5 Key Assumptions

112. Exhibit 6 presents the key assumptions of this economic analysis, as well as the potential direction and relative scale of bias introduced by the assumption.

⁸⁵ U.S. Office of Management and Budget, "Guidelines to Standardize Measures of Costs and Benefits and the Format of Accounting Statements," in *Appendix 4: Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

Exhibit 6	
CAVEATS TO THE ECONOMIC ANALYSIS	
Key Assumption	Effect on Cost Estimate
Design restrictions on future road projects do not add costs to the project.	-
County comprehensive plans are a good indicator of future land use.	?
Timber stand improvement plans will adversely affect <i>Arabis perstellata</i> and Federal assistance (technical and financial) will be withdrawn for those units.	+
There will be no consultations for cell tower construction (proprietary information).	-
The rate of technical assistance will not decrease over time.	+
The presence of other threatened and endangered species has no influence on consultation or project modification costs.	+
Action agency Best Management Practices are baseline protections that are practiced consistently, and as such, do not introduce additional costs to section 7 consultations.	?
- : This assumption may result in an underestimate of real costs. + : This assumption may result in an overestimate of real costs. ? : This assumption has an unknown effect on estimates.	

3.6 Potential Impacts on Small Entities (Businesses, Governments, Non-profits)

113. Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).⁸⁶ However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.⁸⁷ SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, the following represents a screening level analysis of the potential effects of critical habitat

⁸⁶ Small businesses are defined by the Small Business Administration, most commonly in terms of the number of employees or annual receipts. A small organization is “any not-for-profit enterprise...which is independently owned and operated and is not dominant in its field.” A small government is the government of a city, county, town, school district, or special district with a population of less than 50,000, not including tribal governments. Regulatory Flexibility Act, 5 U.S.C. 601 et. seq.

⁸⁷ Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" **and** a threshold for a “substantial number of small entities.” See 5 U.S.C. 605 (b).

designation and co-extensive listing effects on small entities to assist the Secretary in making this certification.

114. This analysis determines whether this rule potentially affects a “substantial number” of small entities in counties supporting critical habitat areas. It also quantifies the probable number of small businesses likely to experience a “significant effect.” In both tests, this analysis examines the total estimated section 7 costs calculated in earlier sections of this report, including those impacts that may be “attributable co-extensively” with the listing of *Arabis perstellata*. This results in a conservative estimate (i.e., more likely to overstate impacts than understate them), because it utilizes the upper bound impact estimate from the earlier analysis.

3.6.1 Identifying Activities That May Involve Small Entities

115. Section 3.2 of this report identifies activities that are within critical habitat, or will otherwise be affected by, section 7 of the Act for *Arabis perstellata*. Exhibit 3 presents the activities identified as being potentially impacted by section 7 implementation for *Arabis perstellata* and its habitat.

116. All of the projects that are potentially affected by section 7 implementation for *Arabis perstellata* are expected to involve either no project modifications, or minor project modifications or opportunity costs. The greatest share of the costs associated with the consultation process typically stems from project modifications (as opposed to the consultation itself). Indeed, costs associated with the consultation itself are relatively minor, with third party costs estimated to range from \$1,200 to \$4,100 per consultation, including the cost of technical assistance.⁸⁸ Therefore, small entities are unlikely to be significantly affected by consultations that do not involve costly project modifications. Thus, this analysis indicates that small businesses participating in consultations involving the following activities and corresponding Action agencies will not be significantly affected as a result of section 7 implementation:⁸⁹

- ***Timber stand improvement plans (Natural Resources Conservation Service)***. As described in section 3.2.1, there are between one and five informal consultations expected involving the development of timber stand improvement plans. Project modifications associated with these consultations will be unlikely as any determination of adverse effect by the Service will result in a loss of funding from NRCS. The opportunity cost is the value of lost technical and financial assistance

⁸⁸ This analysis assumes that Action agencies will bear the cost of preparing a Biological Assessment for activities affected by *Arabis perstellata* critical habitat.

⁸⁹ Potential regional impacts from these actions are discussed in Section 3.4 of this report, and are summarized in following paragraphs.

(\$2,878 approximately). In addition to project modifications a landowner may experience an opportunity cost as a result of lost funding from the NRCS. This analysis assumes, however, that this opportunity cost, if experienced, will be minor and small entities are unlikely to be affected.

- **Road construction and maintenance (Federal Highway Administration).** As detailed in section 3.2.3, there is one formal consultation anticipated involving a road project. Likely project modifications for this project include design restrictions in order to avoid *Arabis perstellata* habitat. The road project is scheduled to take place far enough in the future that there will be no costs associated with this type of project modification.
- **Commercial development (Army Corps of Engineers).** As noted in section 3.2.3, there are one to three informal consultations anticipated involving commercial development projects. This analysis projects that there will be no project modifications associated with consultations on commercial development.
- **Utilities construction and maintenance (Tennessee Valley Authority).** As described in section 3.2.2, TVA consultations on utilities construction and maintenance are expected to have a project modification cost of \$2,000 to \$5,000 per consultation. This analysis anticipates that most costs associated with project modification compliance will either be borne directly by or passed on to the Federal government, which therefore will ultimately bear most of the costs of these project modifications. Because of this cost pass-through, combined with the low cost of project modifications, small entities are unlikely to be affected by section 7 consultation.

117. After excluding the previous set of Action agencies and consultations noted above from the total universe of impacts identified in the body of the analysis, there are no remaining Action agencies or consultations that *may* produce significant impacts on small entities.

3.7 Potential Impacts of Proposed Critical Habitat on the Energy Industry

118. Pursuant to Executive Order No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001, Federal agencies must prepare and submit a “Statement of Energy Effects” for all “significant energy actions.” The purpose of this requirement is to ensure that all Federal agencies “appropriately weigh and consider the effects of the Federal Government’s regulations on

the supply, distribution, and use of energy.”⁹⁰ The Office of Management and Budget has provided guidance for implementing this executive order that outlines nine outcomes that may constitute “a significant adverse effect” when compared without the regulatory action under consideration:

- Reductions in crude oil supply in excess of 10,000 barrels per day;
- Reductions in fuel production in excess of 4,000 barrels per day;
- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million mcf;
- Reductions in electricity production in excess of 1 billion kilowatts per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.⁹¹

119. One of these criteria is relevant to this analysis, increases in the cost of energy distribution in excess of one percent. As described in Section 3.2.2, TVA consultations on transmission line construction and maintenance are expected to have project modification costs of \$4,000 to \$15,000, and administrative costs of \$5,000 to \$36,000. Thus, the total costs incurred by TVA as a result of section 7 implementation range from \$9,000 to \$51,000. Total operating expenses for TVA in 2002 were \$5.2 billion. The total costs incurred as a result of section 7 are less than one thousandth of one percent of TVAs operating expenses, so the impact to energy distribution is not anticipated to exceed the one percent threshold.

⁹⁰ Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>

⁹¹ Id.

120. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1986), Hageman (1985), Samples *et al.* (1986), Stoll and Johnson (1984). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran (1994) and Fausold and Lillieholm (1999) both of which are associated with species conservation. Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.
121. The primary goal of the Act is to enhance the potential for species conservation.⁹² Thus, the benefits of actions taken under the Act are primarily measured in terms of the value the public places on species preservation (e.g., avoidance of extinction, and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (i.e., existence) values. For example, use values might include the opportunity to see *Arabis perstellata* while on a hike, or the recreational use of habitat area preserved as a result of *Arabis perstellata*. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.
122. A number of published studies have demonstrated that the public holds values for endangered and threatened species separate and distinct from any expected direct use of these species (i.e., a willingness to pay to simply assure that a species will continue to exist). These studies include Boyle and Bishop (1987), Elkstrand and Loomis (1998), Kotchen and Reiling (2000), and Loomis and White (1996). While the public's willingness to pay for

⁹² Implementation of section 7 of the Act is expected to substantially increase the probability of recovery for the species. Such implementation includes both the jeopardy provisions afforded by the listing, as well as the adverse modification provisions provided by the designation. Specifically, the section 7 consultations that address the species will assure that actions taken by Federal agencies do not jeopardize the continued existence of the species or adversely modify its habitat.

preservation and enhancement of a wide-range of species has been studied, no studies have specifically addressed the non-use values associated with *Arabis perstellata* or closely related species. Thus, it is not possible to develop a monetary measure of this category of benefit.

123. The benefits to *Arabis perstellata* from section 7 protection are expected to be modest. The primary reasons for this are (1) the lack of a Federal nexus for the majority of land use activities in or near the proposed critical habitat resulting in few (12) section 7 consultations; (2) the expectation that future project modifications (if consultations are to occur) are not likely to generate significant environmental or biophysical changes, thereby precluding potential secondary benefits associated with habitat protection measures; and (3) the relatively small size of the proposed critical habitat, approximately 1,008 acres, with over 95 percent on small private parcels. Therefore, benefits arising from actions taken to protect the species are unlikely to be significant.
124. Other benefits of section 7 protection may include educational/informational benefits resulting from an increased awareness by the public of the extent of *Arabis perstellata* habitat, thereby augmenting existing conservation efforts. For example, the designation may bolster efforts by State heritage agencies and nonprofit land trust organizations to protect ecologically important properties through land management agreements. Informational benefits may also reduce uncertainty regarding the extent of *Arabis perstellata* habitat by providing a firm legal definition of the extent of *Arabis perstellata* habitat.
125. It is not feasible to fully describe and accurately monetize the benefits of section 7 in the context of this economic analysis. The discussion presented in this report provides insight into the potential benefits of section 7 protection based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act. Given these limitations, the Service believes that the benefits of section 7 are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

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Appendix A

PROPOSED CRITICAL HABITAT UNITS

APPENDIX A

**PROPOSED CRITICAL HABITAT UNITS
for *Arabis perstellata***

PROPOSED CRITICAL HABITAT UNITS FOR ARABIS PERSTELLATA						
Unit	Description	State	County	~Acres	Rank	Owner
1	Sky View Drive	KY	Franklin	54	B	Private
2	Benson Valley Woods	KY	Franklin	91	A	Private
3	Red Bridge Ridge	KY	Franklin	14	B	Private
4	Trib to South Benson Ck	KY	Franklin	25	A	Private
5	Davis Branch	KY	Franklin	7	A	Private
6	Onan Bend	KY	Franklin	31	B	Private
7	Shadrock Ferry Road	KY	Franklin	36	B	Private
8	Hoover Site	KY	Franklin	206	A	Private
9	Long Site	KY	Franklin	74	B	Private
10	Strohmeiers Hills	KY	Franklin	50	A	Private
11	US 127	KY	Franklin	27	C	Private
12	Camp Pleasant Branch	KY	Franklin	34	B	Private
13	Saufley	KY	Franklin	20	B	Private
14	Clements Bluff	KY	Owen	28	C	State of Kentucky
15	Monterey U.S. 127	KY	Owen	30	B	Private
16	Craddock Bottom	KY	Owen	56	B	Private
17	Backbone North	KY	Franklin	26	B	Private
18	Scales Mountain	TN	Rutherford	255	B	Private
19	Sophie Hill	TN	Rutherford	132	A	Private
20	Indian Mountain	TN	Rutherford	214	A	Private
21	Grandfather Knob	TN	Wilson	106	B	Private
22	Versailles Knob	TN	Rutherford	83	A	Private

APPENDIX A

PROPOSED CRITICAL HABITAT UNITS for *Arabis perstellata*

Unit Descriptions

Unit 1. Sky View Drive in Franklin County, Kentucky.

Unit 1 is located on the west side of the City of Frankfort, Kentucky. It occurs along U.S. 127 and Skyview Drive on the slopes of the first large ravine system due west of the confluence of Benson Creek and the Kentucky River. It contains approximately 22 ha (54 ac), all of which are privately owned. This site was first observed to have *Arabis perstellata* in 1979. In 2001, surveys conducted by the Kentucky State Nature Preserves Commission (KSNPC) found over 150 plants, but not all habitat was surveyed. This unit has a quality ranking of B. The majority of the plants occur on the west-and south-facing slopes and are associated with bare soil on trails and tree bases.

Unit 2. Benson Valley Woods in Franklin County, Kentucky.

Unit 2 is located west of the City of Frankfort, Kentucky. The unit lies southeast of Benson Valley Road on the south side of Benson Creek. It is privately owned and contains approximately 37 ha (91 ac). The plants occur on the southeast-facing slope. They were first observed in 1979. KSNPC personnel last observed 200+ plants in 2001. The quality ranking for this site is an A. The site is threatened by trampling and competition by weeds.

Unit 3. Red Bridge Ridge in Franklin County, Kentucky.

Unit 3 is located west of KY highway 1005, at the confluence of South Benson and Benson Creeks. The site is privately owned. It is approximately 6 ha (15 ac) in size. Plants at this site were first observed in 1987. In 1990, 75 plants were found along the southeast-and northwest-facing slopes. The quality ranking was B.

Unit 4. Tributary to South Benson Creek in Franklin County, Kentucky.

This unit is located northeast of the City of Frankfort, Kentucky. It occurs along the southeast side of South Benson Creek and the north and south slopes of an unnamed tributary. The site is in private ownership. It is 10 ha (25 ac) in size. In 1996, over 1,000 plants were found along the northwest-facing lower, mid, and upper slopes. The quality ranking for this site is an A, making it one of the best sites in Kentucky for *Arabis perstellata*.

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Unit 5. Davis Branch in Franklin County, Kentucky.

This unit occurs along the east side of Harvieland Drive and Davis Branch. This unit contains approximately 3 ha (7 ac) and is privately owned. Plants were first observed at this site in 1990. In 2001, hundreds of plants were found along the south-facing slope throughout the ravine system. The quality ranking for this site is an A.

Unit 6. Onans Bend in Franklin County, Kentucky.

Unit 6 occurs north of Onans Bend Road and east of KY highway 12. The unit lies along the banks of an unnamed stream near its mouth with the west bank of the Kentucky River. This unit is privately owned and contains approximately 12 ha (30 ac). Plants at this unit were first observed in 1979. In 1990, 100+ plants were found on the south-facing slope. The plants were exceptionally vigorous. The quality ranking for this unit is B. The site is threatened by weed competition.

Unit 7. Shadrock Ferry Road in Franklin County, Kentucky.

This unit is located along the north side of Shadrock Ferry Road (KY highway 898). Property at this location is in private ownership. This unit is approximately 15 ha (37 ac) in size. Plants were first observed at this site in 1996. In 2001, several hundred plants were found on the south-facing slope. The site is quality ranked as a B.

Unit 8. Hoover Site in Franklin County, Kentucky.

This unit lies northwest of the City of Frankfort, Kentucky, along the west side of the Kentucky River on slopes bordering two unnamed tributaries. Plants are widely scattered in small groups along the Kentucky River bluff from River Mile 61.3 to 63.2. This unit is in private ownership and contains approximately 83 ha (205 ac). The plants were first observed in 1990. In 1996, hundreds of plants were found. The quality ranking for this site is an A.

Unit 9. Longs Ravine Site in Franklin County, Kentucky.

Unit 9 is located north of the City of Frankfort, Kentucky, and Lewis Ferry Road. This unit lies east of the Kentucky River in a large ravine and along the steep slopes above the river. This unit is privately owned. There is approximately 30 ha (74 ac) in this unit. In 1990, 250+ plants were found on the northeast, southwest, and northwest-facing slopes. The quality ranking for this site is a B.

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PROPOSED CRITICAL HABITAT UNITS for *Arabis perstellata*

Unit 10. Strohmeiers Hill in Franklin County, Kentucky.

This unit is located south of the Town of Swallowfield and adjacent to Strohmeier Road and U.S. 127. It occurs on steep slopes on the south side of Elkhorn Creek and on the east bank of the Kentucky River, south of the confluence with Elkhorn Creek. The plants at this site were first observed in 1930. The property is privately owned. The site is approximately 20 ha (49 ac) in size. In 1994, the site contained hundreds of flowering plants. The plants were exceptionally vigorous and occurred throughout a large area. This site has a quality ranking of A, and it contains one of the best populations of *Arabis perstellata* in Kentucky.

Unit 11. U.S. 127 in Franklin County, Kentucky.

Unit 11 is located along the east side of U.S. 127 in a ravine just southeast of Elkhorn Creek. The site is privately owned. This unit is approximately 11 ha (27 ac) in size. The plants were first observed in 2001. Approximately 100 plants were found on the west-facing slope. The site has not been revisited since the initial visit. The site has been quality ranked a C.

Unit 12. Camp Pleasant Branch Woods in Franklin County, Kentucky.

Unit 12 is located along the south side of Camp Pleasant Road (KY highway 1707). This site is privately owned and contains approximately 14 ha (35 ac). The first observance of plants at this site was in 1987. In 2001, over 100 plants were found along the lower northwest-facing slope. The quality ranking for this site is a B. Plants at this site are threatened by competition from weeds.

Unit 13. Saufley in Franklin County, Kentucky.

Unit 13 occurs west of the KY 1900 bridge over Elkhorn Creek on the hillside above the creek. The land ownership for this unit is private. The site is approximately 8 ha (20 ac) in size. Plants were first observed in 1988. In 1996, hundreds of plants were found along the top of the ridge on the northeast-facing slope. The quality ranking for this site is B.

Unit 14. Clements Bluff in Owen County, Kentucky.

This unit is located in a ravine facing the Kentucky River along the east side of KY highway 355. The site is owned by the State of Kentucky and is part of the Kentucky River Wildlife Management Area. This unit is approximately 11 ha (27 ac) in size. The plants were first observed at this site in 1980 on the north-facing slope. In 1996, approximately 100 plants occurred at the site. The quality ranking for this site is C.

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PROPOSED CRITICAL HABITAT UNITS for *Arabis perstellata*

Unit 15. Monterey U.S. 127 in Owen County, Kentucky.

Unit 15 is located one mile north of the City of Monterey, Kentucky, just north of the junction of U.S. 127 and KY highway 355. The property is privately owned. It is approximately 12 ha (30 ac) in size. Plants were first observed at this site in 1996. In 1997, 150 plants were found along the southwest-facing slope of an unnamed tributary to the Kentucky River. The quality ranking for this site is a B. The site is being threatened by weedy competition.

Unit 16. Craddock Bottom in Owen County, Kentucky.

This unit is located south of the City of Monterey, Kentucky. It occurs along the west side of Old Frankfort Pike on the west-facing slope just east of Craddock Bottom. Property at this site is privately owned. The site contains approximately 23 ha (57 ac). In 1996, over 150 plants were found. A quality ranking of B has been assigned to this site. In 1996, there was evidence of logging in the surrounding area.

Unit 17. Backbone North in Franklin County, Kentucky.

Unit 17 is located north of KY highway 1900. It occurs in an old river oxbow west of the existing Elkhorn Creek and is privately owned. The unit size is approximately 11 ha (27 ac). Plants were first observed at this site in 1981. In 1990, 200+ plants were found on the southeast facing slope. The quality ranking for this site is B.

Unit 18. Scales Mountain in Rutherford County, Tennessee.

This unit is located west of the City of Murfreesboro, Tennessee, on Scales Mountain, one mile south of Highway 96. The site is privately owned. This unit is 103 ha (225 ac) in size. The plant and habitat are most abundant on the central and eastern knobs. The central and eastern knobs contained more than 200 plants, the western knob contained approximately 100 plants in 2003. The quality ranking for this site is B. The primary threat to this site is competition from weeds.

Unit 19. Sophie Hill in Rutherford County, Tennessee.

Unit 19 is located west of the City of Murfreesboro, Tennessee, on Sophie Hill which lies between Newman and Coleman Hill Roads. The property at this site is privately owned. The unit is approximately 53 ha (132 ac) in size. The plant and habitat are abundant on both Sophie and Townsel Hills. Sophie Hill site contains over 200 plants and the Townsel Hill site contains over 300 plants for a total of over 500 plants for this one population. The quality ranking for this site is A.

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Unit 20. Indian Mountain in Rutherford County, Tennessee.

Unit 20 is located west of the City of Murfreesboro, Tennessee, on Indian Mountain between Highway 96 and Coleman Hill Road. This site is privately owned. The unit size is approximately 87 ha (214 ac). The plant and habitat are abundant on all three knobs. The area contains more than 300 plants in good to excellent habitat. The quality ranking for this site is A.

Unit 21. Grandfather Knob in Wilson County, Tennessee

Unit 21 is located west of the city of Cainsville, Tennessee between Cainsville and Spain Hill Roads on Grandfather Knob. Plants and habitat are abundant. The site is privately owned. The unit size is approximately 43 ha (106 ac). There are over 150 plants occurring in the unit. This population is 20 miles from the nearest extant *Arabis perstellata* population in Tennessee. The quality ranking for this site is B.

Unit 22. Versailles Knob in Rutherford County, Tennessee

Unit 22 is located in southwest Rutherford County on Versailles Knob. There are over 200 plants occurring in abundant habitat on this knob. The site is privately owned and contains over 100 plants. The unit size is approximately 34 ha (83 ac). The quality ranking for this site is A.