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May 21, 2018

Wayne National Forest
Attn: Plan Revision
13700 US HWY 33
Nelsonville, OH 45764

Delivered via email to: WaynePlanRevision@fs.fed.us

Dear Lisa Swiderski:

Thank you for the opportunity to contribute to the development of the Wayne National Forest (WNF) forest plan revision assessment. This letter is in response to the Notice initiating the assessment phase of the forest plan revision for the WNF (83 FR 17359), and its invitation to participate in the development of the assessment. We are providing information about ecological conditions important to wildlife species that we have identified as a priority for management. We offer suggestions on the assessment process that we believe will both improve conservation outcomes and help fulfill the obligations for forest planning.

Developing and implementing robust, science-based forest plans under the 2012 Planning Rule (planning rule) (36 C.F.R. § 219) will result in public confidence that the Forest Service is fulfilling its mission and conservation obligations and enabling integrated landscape-level decision making and more efficient project-level implementation.

These comments draw from Defenders of Wildlife's extensive history of engagement in the development and implementation of the 2012 Planning Rule, particularly the contents of our three publications on forest planning, wildlife and habitat, all of which are attached as appendices to this document:

- 1) *Planning for Diversity*
- 2) *Planning for Connectivity*
- 3) *Planning for Climate Change* (draft)

The assessment should present information provided by the forest plan and other monitoring and other data collection to allow the responsible official and interested parties to identify how current conditions and trends can be influenced directly or indirectly by Forest Service

management, and based on this, identify specific needs for change in plan components. The assessment should therefore seek to answer relevant questions focused on the “need for change.” This should focus on experience with the current plan and provide the basis for evaluating whether specific direction should be changed. The assessment should be forward-looking, anticipating future stressors, such as those driven by climate change, and facilitating projections of future trends in the condition of the plan area.

Our comments are comprised of the following sections:

1. Authority of Forest Service to Manage Wildlife
2. Best available scientific information
3. Assessing “Diversity of plant and animal communities”

Step 1: Which federally protected, potential species of conservation concern, and potential focal species occur in the forest?

Step 2: What are the ecosystems and habitat types that exist across the forest?

Step 3: What are the key ecosystem characteristics and ecological conditions that are necessary for at-risk species?

Step 4: What key areas support target species?

Step 5: What conditions and trends are necessary for evaluating ecological integrity?

Seven questions on past, current and future conditions

4. Appendix 1: State Listed Animals and Species of Concern
5. Appendix 2: State Listed Plants

Please let us know if you have any comments or questions regarding the content of this letter. We look forward to working with you on the next phase of the forest plan revision.

Sincerely,

Peter Nelson, Director, Federal Lands Program
Lauren McCain, Senior Federal Policy Lands Analyst
Aimee Delach, Senior Policy Analyst {and local contact: adelach@defenders.org}

I. Authority of the Forest Service to manage wildlife

Some national forests engaged in management plan revision processes have mistakenly indicated that states, represented by their wildlife agencies, have ultimate management authority over wildlife. The courts have consistently upheld that the federal government has supremacy over its lands under the Property Clause of the U.S. Constitution (Article IV, Section 3), which grants Congress the “Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States.” In *Kleppe v. New Mexico* the Court stated, “the ‘complete power’ that Congress has over public lands necessarily includes the power to regulate and protect the wildlife living there.” 426 U.S. 529, 541 (1976). The Court in *Kleppe* also clearly addressed the limited nature of state powers: “those powers exist only in so far as [their] exercise may be not incompatible with, or restrained by, the rights conveyed to the Federal government by the Constitution.” *Id.* at 545. While the Forest Service clearly has the authority to manage wildlife habitat, it also has the power to manage species populations. This includes managing the public's use of wildlife on national forests, grasslands, and prairies.

II. Best available scientific information

The assessment phase of the planning process provides the scientific foundation for the remainder of the planning process. The assessment report should provide a common understanding of the science underpinning the management issues facing the national forest, which will facilitate a more transparent and collaborative approach to resolving those management issues and a more productive discussion of plan components for the revised plan.

The assessment must be informed by the best available scientific information (BASI).¹ The assessment report must document which information is the most accurate, reliable and relevant to the issues considered, the basis for that determination and relevant information needs.² We will include below some information relevant to particular species.

Assessments must consider information from studies, monitoring reports, plans, other assessments and documents.³ It should reference specific information in these sources that supports its conclusions and that it determines is the BASI. Assessments should also include the review of the conservation planning and land-use policies of other entities required by

¹ 36 C.F.R. § 219.3, 219.6(a)(3).

² 36 C.F.R. § 219.6(a)(3).

³ 36 C.F.R. § 219.6(a)(1).

219.4(b)(2). Information for listed species should include relevant portions of applicable recovery plans, and assessments of progress towards recovery.

The assessment should consider the results of prior monitoring of the existing plan. The assessment report should include a summary of what was learned from that monitoring, focusing on the effects and effectiveness of existing plan components.

It is also important to get the assessment done before attempting to move forward to other planning steps. It is true that the “planning framework” is an iterative process, and the three phases may overlap.⁴ However, each step in the planning process depends on the steps before it, and if additional work is done on a prior step, additional work will also be needed on any subsequent steps that have been taken. For example, if information is added to the assessment after a “need for change” has been determined, the need for change will need to be revisited and documented. It does not shorten the planning process to move ahead without completing the assessment. (However, if new information, meaning it was previously not “available,” is found, it should be considered.)

III. **Assessing “Diversity of plant and animal communities”**

During the assessment phase, the Forest Service collects and evaluates ecological information to develop plan components associated with ecosystem diversity, integrity, and species persistence.⁵ Assessments evaluate conditions and trends for ecosystems and species in the context of a broader landscape.⁶ This context is especially important to at-risk species, because their risk of persistence in the plan area is related to circumstances affecting their broader status, and for some species it is their “contribution” to that broader scale status that is important to complying with the planning rule.⁷ Assessments are then used during plan revision

⁴ 36 C.F.R. § (219.5(a))

⁵ 36 C.F.R. § 219.19 defines *ecological integrity* as, “[t]he quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence.” There is an obligation to, “provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area” under 219.9(b)(1). The rule defines *viable population* as, [a] population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments” at § 219.19.

⁶ 36 C.F.R. § 219.5(a)(1).

⁷ 36 C.F.R. § 219.9(b)(2).

to determine if changes to the existing plan are needed and to inform the development of plan components.⁸

The planning rule requires the assessment to identify and evaluate fifteen categories of existing information relevant to the plan area.⁹ The requirements that relate most directly to “diversity” include the following subsections:

1. Terrestrial ecosystems, aquatic ecosystems, and watersheds;
3. System drivers, including dominant ecological processes, and stressors, and the ability of ecosystems to adapt to change; and,
5. Threatened, endangered, proposed and candidate species, and potential species of conservation concern (SCC).

Though outlined as 15 discrete topics in the 2012 rule, we recommend that assessments integrate tasks 1, 3, and 5 because these serve as the basis for evaluating the ecological condition of the landscape. Planning directives support this integrative approach.¹⁰

An assessment is also used to guide the development of the monitoring program.¹¹ A monitoring evaluation report must in turn be used to “inform adaptive management of the plan area.”¹² The assessment should therefore be developed with adaptive management in mind – by identifying assumptions associated with ecosystem integrity or species persistence that could be tested during plan implementation and monitoring, for example. The assessment should also identify missing information so that it can be collected and evaluated later to determine if the plan components need to change. The assessment report must document that missing information¹³ and address other key considerations. We recommend the following step-wise process.

Step 1: Which federally protected, potential species of conservation concern, and potential focal species occur in the forest?

⁸ 36 C.F.R. § 219.7(c)(2).

⁹ 36 C.F.R. § 219.6(b).

¹⁰ FSH 1909.12, ch.10 § 12.1, “[s]ections 12.1 through 12.55 of this Handbook describe considerations for assessing ecological topics. While these sections cover topics individually, Responsible Officials are encouraged to integrate these topics together in the assessment report.

¹¹ 36 C.F.R. § 219.5(a)(3), “[t]he plan-level monitoring is informed by the assessment phase...”

¹² 36 C.F.R. § 219.12(d)(2).

¹³ 36 C.F.R. § 219.6(a)(3), “[t]he report should document information needs relevant to the topics...”

The planning rule requires that the combination of ecosystem and species-specific plan components provide ecological conditions necessary for at-risk species. It is important to keep this overriding objective in mind from the beginning of the process to ensure the revised plan meets the rule's requirements at the end.¹⁴

To improve the effectiveness of ecosystem plan components in meeting the needs of individual species, and to generally improve the efficiency of the planning process, we strongly recommend that the "coarse filter" conservation strategy be designed with selected species in mind.

Consequently, the first factor that should be considered in assessing "diversity" is the set of target species for the forest plan. Specifically, the habitat and other ecological needs of some individual species should be included when defining ecosystems and selecting their key characteristics. Target species would be selected from among:

1. Federally threatened, endangered, proposed and candidate species
2. Species of Conservation Concern identified pursuant to 219.9(b)
3. Focal species selected pursuant to 219.12(a)(5)(iii)
4. Species commonly enjoyed and used by the public selected pursuant to 219.10(a)(5)

We focus on 1-3. Federally protected species and SCC are collectively referred to as "at-risk" species.

Federal endangered, threatened, proposed, and candidate species relevant to the planning process

Federally recognized species (endangered, threatened, proposed, candidate) must be identified through the coordination with Endangered Species Act (ESA) consulting agencies. The assessment phase provides an ideal opportunity for the WNF to seek and utilize species-specific information from consulting agencies, in this case the U.S. Fish and Wildlife Service (USFWS), that may be used to design the forest plan. Early engagement with these government agencies complies with the planning rule.¹⁵ Early contributions to a forest plan by the USFWS can help make more efficient the Section 7(a)(2) consultation process for the plan and increase the

¹⁴ 36 C.F.R. § 219.9(b).

¹⁵ 36 C.F.R. § 219.4(a)(1) directs the responsible official to "engage the public—including" ... "Federal agencies" ... "early and throughout the planning process where feasible and appropriate." Under 219.6(a)(2), the regional forester should coordinate with and provide opportunities for government agencies "to provide existing information for the assessment."

likelihood of contributing to recovery of listed species and avoiding listing of proposed and candidate species under Section 7(a)(1) of the ESA.¹⁶ Federally recognized species must be addressed by plan components if they “may be present” in the plan area¹⁷ or if they are not present but would be expected to occur there to contribute to recovery. They should be included as target species documented in the assessment.

According to the U.S. Fish and Wildlife Service¹⁸, the following listed animals and plants are found within the twelve counties that comprise the three units¹⁹ of WNF. The Forest should assess whether these species are present within the plan area or could benefit from management prescriptions within the forest plan area:

Species	Category	State Status	Federal Status	Counties
<i>Aconitum noveboracense</i> Northern Monkshood	Plant	Endangered	Threatened	Hocking
<i>Cryptobranchus alleganiensis alleganiensis</i> Eastern Hellbender	Amphibian - Salamander	Endangered	Candidate	Athens, Monroe, Scioto, Vinton, Washington
<i>Cyprogenia stegaria</i> Fanshell	Invert. - fw bivalve	Endangered	Endangered	Athens, Gallia, Lawrence, Morgan, Scioto, Washington
<i>Epioblasma obliquata obliquata</i> Purple Cat's Paw	Invert. - fw bivalve	Endangered	Endangered	Washington (extirpated?), Scioto
<i>Epioblasma torulosa rangiana</i> Northern Riffleshell	Invert. - fw bivalve	Endangered	Endangered	Washington (extirpated?), Scioto
<i>Epioblasma triquetra</i> Snuffbox	Invert. - fw bivalve	Endangered	Endangered	Athens, Gallia, Hocking, Lawrence, Morgan, Scioto, Washington
<i>Lampsilis abrupta</i> Pink Mucket	Invert. - fw bivalve	Endangered	Endangered	Gallia, Lawrence, Scioto, Washington

¹⁶ 16 U.S.C. §§ 1536(a)(1)-(2).

¹⁷ 50 C.F.R. 402.12(c)(1), (d).

¹⁸ <http://ecos.fws.gov>

¹⁹ Athens Unit: Athens, Hocking, Morgan, Perry, Vinton, and Washington Counties; Ironton Unit: Gallia, Jackson, Lawrence, Scioto Marietta Unit: Monroe, Noble, and Washington Counties.

<i>Isotria medeoloides</i> Small Whorled Pogonia	Plant	Endangered	Threatened	Hocking, Scioto
<i>Lampsilis orbiculata</i> Pink Mucket	Invert. - fw bivalve	Endangered	Endangered	Athens, Morgan
<i>Myotis septentrionalis</i> Northern Long- eared Bat	Mammal	Species of Concern	Threatened	Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Morgan, Noble, Perry, Scioto, Vinton, Washington
<i>Myotis sodalis</i> Indiana Myotis	Mammal	Endangered	Endangered	Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Morgan, Perry, Scioto, Vinton, Washington
<i>Nicrophorus americanus</i> American Burying Beetle	Insect – beetle	Endangered	Endangered	Athens, Hocking, Morgan, Perry, Vinton
<i>Plethobasus cyphus</i> Sheepnose	Invert. - fw bivalve	Endangered	Endangered	Athens, Gallia, Lawrence, Scioto, Washington
<i>Pleurobema clava</i> Clubshell	Invert. - fw bivalve	Endangered	Endangered	Athens, Hocking, Morgan, Scioto, Washington
<i>Quadrula cylindrica</i> cylindrica Rabbitsfoot	Invert. – fw bivalve	Endangered	Threatened	Washington (extirpated?)
<i>Spiraea virginiana</i> Appalachian Spiraea	Plant	Endangered	Threatened	Scioto
<i>Trifolium stoloniferum</i> Running Buffalo Clover	Plant	Endangered	Endangered	Hocking, Jackson, Lawrence, Vinton
<i>Villosa fabalis</i> Rayed Bean	Invert. – fw bivalve	Endangered	Endangered	Scioto

The ESA requires the Forest Service and other federal agencies to, “in consultation with and with the assistance of the Secretary (listing agencies), utilize their authorities in furtherance of

the purposes of this Act by carrying out programs for the conservation²⁰ of (listed species).”²¹ Therefore the ESA requires that the Forest Service must use its authorities, including National Forest Management Act (NFMA) and its planning process and resulting plans, in furtherance of recovery of listed species.²² Since forest plans govern all national forest management actions, the Preamble to the planning rule acknowledged that forest plans should be considered the program by which the agency complies with Section 7(a)(1).²³

There is an existing process for interagency coordination that should be used to answer the question that the planning rule poses: *Does a forest plan contribute to recovery of listed species?* The Consultation Handbook used by the listing agencies describes “proactive conservation reviews” under ESA Section 7(a)(1).²⁴ According to this Handbook, such reviews are appropriate for major national programs, and they are also “appropriate for Federal agency planning.” They would be especially helpful in confirming that the plan has included the ecological conditions necessary for recovery of listed species.²⁵ We recommend that the WNF work with the USFWS to conduct a Section 7(a)(1) conservation review for the WNF forest plan revision.

A forest plan should provide ecological conditions necessary for a recovered population. The assessment should provide the basis for this determination, and should therefore focus on identifying these ecological conditions with the participation of the USFWS. The Forest Service Planning Handbook recognizes recovery plans by stating that their “conservation measures and actions” should be considered.²⁶ The assessment should also evaluate progress made by the

²⁰ “Conservation” is defined by the ESA to mean “the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary.”

²¹ 16 U.S.C. §§ 1536(a)(1).

²² 36 C.F.R. § 219.9(b)(1) requires that each forest plan include plan components that “provide the ecological conditions necessary to contribute to the recovery of threatened and endangered species ...”

²³ “These requirements (to contribute to recovery) will further the purposes of § 7(a)(1) of the ESA, by actively contributing to threatened and endangered species recovery and maintaining or restoring the ecosystems upon which they depend.” 77 Fed. Reg. 21215.

²⁴ “Endangered Species Consultation Handbook,” U. S. Fish & Wildlife Service and National Marine Fisheries Service (1998), Section 5.1. (https://www.fws.gov/ENDANGERED/esa-library/pdf/esa_section7_handbook.pdf)

²⁵ The Consultation Handbook also encourages consultation at broader scales such as “ecosystem-based” consultations.

²⁶ FSH 1909.12, Ch. 20 § 23.13a, and additionally, the Handbook also suggests consideration of “limiting factors” and “key threats” (which should include those that were the basis for listing the species). Finally, the Handbook states that the planning team should, “Engage with the U.S. Fish and Wildlife Service and National Marine Fisheries Service, as appropriate, in the evaluation of existing conditions for threatened and endangered species. The direct use of recovery plans for forest planning should be a goal, and more than a “consideration,” but it is unlikely that recovery plans would provide complete answers to what the necessary ecological conditions are in the plan area.

WNF under the current plan to conserve and recover endangered and threatened species and achieve recovery plan objectives (where species recovery plans exist).

Potential Species of Conservation Concern in the plan area

While the responsible official for most forest planning decisions is the supervisor of the national forest, identifying SCC is the responsibility of the regional forester.²⁷ It is part of the “process for plan development or revision,” but the rule does not specify when during the process it should occur. The regional forester should identify SCC early enough that integrating them into the assessment, including the identification of key ecosystem characteristics, does not delay the assessment process.²⁸

The rule contains only two criteria the regional forester can use to identify SCC:²⁹

- The species must be known to occur in the plan area.
- The best available scientific information indicates substantial concern about the long-term persistence capability of the species in the plan area.

The responsible official does not have the discretion to exclude species the regional forester has found to meet these regulatory criteria. Our interpretation is that it is the role of the responsible official to provide the regional forester with information about species occurrence and capability to persist in the plan area and to identify “potential” SCC.³⁰

While a literal translation of “known to occur” might exclude species not presently found there, the Planning Handbook adds a broader criterion of “is becoming established in the plan area.” This calls for a more rigorous analysis that should also encompass species that are likely to become established in the plan area over the “long-term” (as that term is used in the definition of SCC). In addition, lack of recent occurrence records should not be the sole basis for not selecting species that were formerly found in the plan area. The Forest should evaluate the reasons and potential for reestablishment.

²⁷ 36 C.F.R. § 219.7(c)(3).

²⁸ See FSH 1901.12, Ch. 10 § 12.13.4.b. The planning handbook also suggests “species at risk” as a key ecosystem characteristic. FSH 1901.12, Ch 10 § 12.13 (Exhibit 01).

²⁹ 36 C.F.R. § 219.9(c).

³⁰ 36 C.F.R. § 219.6(b)(5), [t]he term “potential” SCC is used in the rule as a requirement for assessments, but is not defined. It should apply to any species that *may* meet the two criteria in 219.19(c). The assessment should include relevant information about the status and trend of all species considered for SCC so that the regional forester can review it and use it in making the decision.

The directives make an important distinction between species of broader-scale concern and those where there is local conservation concern. All but one of the categories in the directives address the former by encompassing concerns expressed by NatureServe or government agencies about viability of the species at a broader scale than the plan area. The overall approach is to cast a wide net so that the Regional Forester can consider species where concern about persistence is indicated for either or both of these reasons. Local conditions in a plan area are relevant at the SCC identification stage as a basis for including additional species for which there might not be broader concern; not as a sole basis for rejecting species for which there is a broader concern.

For some species, range-wide viability risk has already been reliably determined using the best available scientific information. Under our interpretation of the rule, these species should be identified as SCC if they are known to occur in the plan area based on the ecological principle that a species at-risk range-wide is necessarily at-risk wherever it is found. We note that the assessment must evaluate information “relevant” to species that occur in the plan area; not just about the status of species within the plan area.³¹

The Regional Forester should also include species listed as sensitive by the Forest Service. A sensitive species is a “plant or animal species identified by a regional forester for which population viability is a concern” due to significant current or predicted downward trends in population numbers or density, or habitat capability.³² If a sensitive species is known to occur in a plan area, it should therefore be identified as an SCC for that area. State strategic wildlife action plans and tribal sensitive species lists should also be considered as well as other authoritative sources, including, for example, Fish and Wildlife Service birds of conservation concern.

There may also be concerns about risks to persistence for other species known to occur in a plan area. The regional forester should evaluate any suggested potential species against the criteria in 219.9(c) on request.

If the information about a potential SCC’s abundance, distribution, threats, trends, or response to management indicates that the species may not continue to persist over the long term in the plan area with a sufficient distribution to be resilient, the regional forester must either select it as an SCC or document the rationale for finding it does not meet the SCC criteria. When credible organizations express concern for a species, the burden should be on the Forest

³¹ 36 C.F.R. § 219.6(b), FSH 1909.12, Ch. 10 § 12.52a.2.

³² FSM 2670.5.

Service to demonstrate that the species is secure in the plan area, taking into account the broader scale circumstances and their effect on the species' persistence in the plan area. Species considered as potential SCC but not meeting the criteria in 219.9(c) may be selected as public interest species or focal species.

It is not appropriate under the planning rule to determine that a species is secure in the plan area simply because the Forest Service chooses to minimize impacts on the species. That calculus plays into the viability determination for a proposed plan (i.e., a finding that the forest plan sufficiently protects the species)³³ rather than the identification of SCC.

Identification of SCC by the regional forester is a preliminary planning step. It involves applying regulatory criteria to species in the plan area based on best available scientific information. Identifying SCCs requires the exercise of professional judgment, but permits no discretion. The determination of "substantial concern" is referring to scientific concern that has been expressed that is applicable to species persistence in the plan area, not a subjective concern by the regional forester. We will take a close look at the regional forester's scientific basis for rejecting species as SCC when there are documented viability concerns.

In our opinion, it is appropriate and necessary for this determination to occur prior to most of the assessment process. However, selection of SCC may be revisited throughout the planning process as required by new information applicable to the two criteria in 219.9(c), and would not become final until the forest plan is approved.

Defenders has compiled lists of the species from the Ohio Department of Natural Resources' state listed plants and animals³⁴ found within the twelve counties that comprise the three units of WNF and may be appropriate to be SCCs. These are included as **Appendix 1 (Animals)** and **Appendix 2 (Plants)**, following these comments. Other forest-dependent species that could be candidates for SCC determination are the bobcat (*Felis rufus*), which was recently removed from the state's endangered species list, and the fisher (*Pekania [=Martes] pennanti*), which has repatriated parts of Pennsylvania and West Virginia and may be returning to Ohio as well.

Existing information relevant to the plan area for potential SCC must be part of the assessment³⁵

³³ 36 C.F.R. § 219.9(b).

³⁴ <http://wildlife.ohiodnr.gov/species-and-habitats/state-listed-species/state-listed-species-by-county>

³⁵ 36 C.F.R. § 219.6(b)(5).

This includes the information compiled by the responsible official that is applicable to the criteria for identification of SCC. The assessment must provide information about the relative contribution of the plan area to range-wide species persistence to address the possibility that species that are selected as SCC may need to be evaluated where conditions for viable populations are beyond the authority of the Forest Service or capability of the plan area.³⁶ The assessment should also document the application of best available science concerning the SCC and any uncertainty associated with the inclusion or exclusion of SCC that should be addressed in the monitoring program.³⁷

Potential focal species

The rule only discusses focal species in conjunction with the plan monitoring program developed by the responsible official.³⁸ However, the purposes of a focal species are to permit “inference to the integrity of the larger ecological system to which it belongs” and to provide “meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area.”³⁹ Therefore, it makes sense that focal species will be a topic of discussion within the ecological integrity assessment; for example, we expect they will play a large role in the process for identifying key ecosystem characteristics. Given the scale and crosscutting nature of ecosystems, we recommend that the regional forester play a role in identifying focal species. It is also important to note that effective monitoring may require that some SCCs be selected as focal species.

Step 2: What are the ecosystems and habitat types that exist across the forest?

The planning rule specifies evaluating the integrity of three kinds of land units: 1) terrestrial ecosystems and watersheds; 2) aquatic ecosystems and watersheds; 3) riparian areas. It also requires an evaluation of the diversity of ecosystems and habitat types.⁴⁰ Rare floral and faunal communities should be included.⁴¹

³⁶ 36 C.F.R. § 219.9(b)(2).

³⁷ 36 C.F.R. § 219.12(a)(4)(i), The responsible official must consider, “[i]nformation needs identified through the planning process as most critical for informed management of resources on the plan area...”

³⁸ 36 C.F.R. § 219.12(a)(5)(iii).

³⁹ 36 C.F.R. § 219.19.

⁴⁰ 36 C.F.R. § 219.9(a)(1), “the plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore their structure, function, composition, and connectivity,” and 36 C.F.R. § 219.9(a)(2), “[t]he plan must include plan components, including standards or guidelines, to maintain or restore the diversity of ecosystems and habitat types throughout the plan area.”

⁴¹ FSH 1909.12, Ch. 10 § 12.11.

Ecosystems are defined by ecological features rather than political or administrative boundaries. The evaluation of ecological integrity and species viability requires an understanding of the broader landscape influencing and influenced by the ecosystems in the plan area. Consequently, selected ecosystems must include portions of the plan area but are likely to extend beyond it (see definition of “landscape”⁴²).

To facilitate planning across unit and jurisdictional boundaries, we recommend that regional foresters take the lead in identifying ecosystems and watersheds in coordination with states and other entities operating at a broad scale. Consistent use of ecosystems for planning will also facilitate the Regional Forester’s identification of SCC and lead to better and more efficient broader-scale monitoring of ecosystems and wildlife.⁴³

The choice of ecosystems should consider the appropriate scale for assessing and planning for ecosystem characteristics. The rule allows planning at the most appropriate scale to address issues and resource concerns specific to a plan area,⁴⁴ and these planning topics should be identified early in the assessment process. The scale for evaluating ecosystem integrity should recognize the scale of dominant disturbance regimes. To describe the relative contribution of the plan area to ecological sustainability, ecosystems may also need to be delineated at a broader scale. Nested ecosystems at multiple scales may need to be identified. We recommend that the assessment include maps identifying the various ecosystem units that will be used in the planning process.

The planning rule also states that plans must include plan components to maintain or restore the ecological integrity of riparian areas⁴⁵ and identify “riparian management zones” where riparian-dependent resources receive primary emphasis.⁴⁶ The assessment should therefore identify “riparian areas,”⁴⁷ which may include parts of both terrestrial and aquatic ecosystems.

⁴² 36 C.F.R. § 219.19, As defined by the planning rule, *landscape* means, “[a] defined area irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plan communities, repeated in similar form throughout such a defined area.”

⁴³ 36 C.F.R. § 219.12(b).

⁴⁴ 77 Fed. Reg. 21191.

⁴⁵ 36 C.F.R. § 219.8(a)(3).

⁴⁶ 36 C.F.R. § 219.19 defines *riparian management zones* as, “[p]ortions of a watershed where riparian-dependent resources receive primary emphasis, and for which plans include plan components to maintain or restore riparian functions and ecological functions.”

⁴⁷ 36 C.F.R. § 219.19 defines riparian areas as, “[t]hree Three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at variable widths.”

To comply with the requirements for riparian areas in the plan, the assessment should also address the seven factors listed for riparian areas.⁴⁸

Step 3: What are the key ecosystem characteristics and ecological conditions that are necessary for at-risk species?

Plan components must provide ecological conditions necessary for at-risk species (i.e., species classified under the ESA and species identified as SCC). The planning rule's approach relies on the use of key characteristics in assessment, planning and monitoring to represent the condition of ecosystems. These characteristics are identified, selected, and used during the assessment phase.⁴⁹ In order for the forest plan to effectively provide ecological conditions for at-risk species, the key characteristics chosen for assessment and carried forward for plan component development should capture the ecological conditions needed for at-risk species.

Attributes include those associated with the ecological conditions necessary for the persistence of at-risk species, including the include amount, quality, distribution and connectivity of habitat. "Ecological conditions" include "habitat and other influences on species and the environment," including structural developments and human uses.⁵⁰ It is critical that the assessment identify the specific ecological conditions and ecosystem characteristics most relevant and useful for developing plan components that meet the diversity requirements of the rule.

It is very important that the assessment carefully consider human structures and uses as an attribute of ecological conditions. Identification of these ecological conditions during the assessment is necessary to provide a basis for plan components that manage human structures and uses. In most cases, roads and their use are likely to be the predominant direct human influence on diversity in the plan area, so information concerning the impact of roads on species persistence should be incorporated into the assessment.⁵¹

There should be overlap between biophysical ecosystem characteristics for ecological integrity and ecological conditions necessary for at-risk species. It is critical for the assessment to

⁴⁸ 36 C.F.R. § 219.8(a)(3)(i) calls for including "aquatic and terrestrial habitats," "ecological connectivity" and widths of potential riparian zones.

⁴⁹ FSH 1909.12, Ch. 10 § 12.13.

⁵⁰ 36 C.F.R. § 219.19 defines *ecological conditions* as, The biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological systems. Ecological conditions include habitat and other influences on species and the environment. Examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species.

⁵¹ That should include information from roads analysis (FSM 7712) relevant to diversity (such as the effect of existing roads as a stressor), and should be integrated with the infrastructure portion of the assessment.

establish the connection between coarse-filter ecosystem characteristics/habitat conditions and the species that depend upon them for persistence. The assessment must also establish the connection between changes in ecological conditions and changes in species populations.

The suitability of habitat for at-risk species cannot be divorced from the spatial distribution of that habitat. The rule does not directly address the landscape pattern of ecosystems and patches, but these patterns are inherent to the concepts of ecosystem and landscape composition, structure, function and, especially, connectivity. The spatial arrangement, size, shape, number and kind of patches determine the structure of a landscape. Consequently, it is of paramount importance that the assessment identifies appropriate patch metrics as key ecosystem characteristics for at-risk species where possible.

During the planning phase, the responsible official must determine whether the likely future ecological conditions under the plan will maintain a viable population of SCC in the plan area that will persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments.⁵² It is therefore critical that the assessment address species population distributions as key ecosystem characteristics.

To demonstrate that plan components will be effective in maintaining a “viable population” in the plan area, the assessment must provide a means of determining a “sufficient distribution.” The assessment should describe the relationship between connectivity and the distribution of species necessary for persistence, especially with regard to stressors like climate change. It is important that the assessment evaluate how species move, what barriers to those movements may exist and how the forest plan can reduce the impact of those barriers within the context of recovery, conservation and viability. The nature of the relationship between all of these attributes and the actual condition of the species should be documented so that this fundamental relationship can be tested as a “relevant assumption” under the monitoring program.⁵³

Step 4: What key areas support target species?

⁵² 36 C.F.R. § 219.19.

⁵³ 36 C.F.R. § 219.12(a)(2) states, “[t]he plan monitoring program sets out the plan monitoring questions and associated indicators. Monitoring questions and associated indicators must be designed to inform the management of resources on the plan area, including by testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan’s desired conditions or objectives. Questions and indicators should be based on one or more desired conditions, objectives, or other plan components in the plan, but not every plan component needs to have a corresponding monitoring question.”

For many species, some places within the WNF plan area will be more important than others. Some places may serve as source habitat, secure habitat, breeding grounds, or strongholds that export individuals, while others may be areas where survival and successful reproduction are more challenging. Similarly, some portions of the planning area may provide connectivity between populations or source habitats. Potential refugia under future climate conditions should also be considered. It is vital that the assessment pinpoint these areas of high-value to at-risk species so that plan components can be developed for application to these areas with the benefit of this information. The assessment should be as spatially explicit as possible.

The assessment must also recognize the relative importance of different areas at scales appropriate to each species. The assessment should identify specific ecosystems, watersheds or sites that provide relatively high-quality habitat for a target species in the plan area. Providing this context for developing plan components may indicate that species persistence depends on more protective management of portions of the plan area, or of the plan area as a whole, relative to other areas.

Species assessments are also a part of the wilderness, wild and scenic rivers, and research natural area evaluations that should occur during the assessment process. This information should help provide a spatial context for the ecological components of the assessment, and may be useful for identifying priority areas for conservation.

Step 5: What conditions and trends are necessary for evaluating ecological integrity?

For each of the key ecosystem characteristics and ecological conditions for at-risk species, the assessment should 1) identify existing relevant information and 2) evaluate that information.⁵⁴ A key purpose is to identify the causes of trends in the attributes to determine the role that forest plan components should play in maintaining or restoring integrity.

For each attribute, this evaluation should answer the seven questions below that address conditions, trends and sustainability and their relationship to the land management plan.⁵⁵

1. What was the historic condition of the forest (when such information exists)?

The concept of ecological integrity is used to represent the condition of an ecosystem. When its key ecosystem characteristics occur within the natural range of variation (NRV), an ecosystem is

⁵⁴ 36 C.F.R. § 219.6(b).

⁵⁵ 36 C.F.R. § 219.5(a)(1).

considered to have integrity.⁵⁶ NRV can be thought of as a reference condition reflecting resilient “natural” conditions that can be estimated using information from historical reference ecosystems or by other science-based methods. The planning rule directs the Forest Service to manage key characteristics in light of these reference conditions, for the purpose of sustaining ecosystems and wildlife.

The NRV requires identification of a range of values that occur over time in a defined area. Such ranges are often best displayed as frequency distributions for the selected ecosystem characteristics showing the portion of the plan area within each category of values. This important process can involve extensive evaluation of the assessment information, especially information compiled for key ecosystem characteristics. The determination of the NRV, like all aspects of the planning process, is subject to the requirement for using best available scientific information to inform the process.⁵⁷

We recognize that data for quantifying NRV may not exist for some ecological conditions necessary for viability of at-risk species. We encourage thoughtful consideration and documentation of decisions regarding the choice of key ecosystem characteristics and how they provide the basis for assessing and planning for at-risk species. In some cases a qualitative treatment of a more relevant ecological condition may be better than a more quantitative treatment of a less relevant condition.

2. What is the current condition?

Departures from the NRV for key ecosystem characteristics indicate that the ecological integrity of the ecosystem may not be sustainable,⁵⁸ and therefore diversity would not be achieved.⁵⁹ However, looking solely at the NRV for dominant biological characteristics ignores how other human factors can affect diversity. Roads and other human uses and structures can affect connectivity by reducing the ability of wildlife to reach habitat with desired biological characteristics and the security that allows wildlife to fully utilize those characteristics if they do reach it.

⁵⁶ 36 C.F.R. § 219.19 defines *ecological integrity* as, “The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence.

⁵⁷ 36 C.F.R. § 219.3.

⁵⁸ 36 C.F.R. § 219.8(a).

⁵⁹ 36 C.F.R. § 219.9(a).

Evaluating ecological integrity should provide a foundation for evaluating species persistence and viability. However, integrity is a “coarse filter” approach; additional analysis is needed at a species level. The current conditions of ecosystem characteristics that are necessary for individual at-risk species should be included in the assessment.

3. What are the relevant drivers and stressors of these conditions?

The assessment should identify stressors related to these conditions, including stressors from outside of the plan area that may affect a species. In particular, the planning rule focused on the importance of taking climate change into account. Section 219.6(b)(3) requires the assessment to identify and evaluate information regarding “the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change.” It is therefore critically important that the assessment consider possible future scenarios for climate change and other so-called “system drivers” and identify those most likely to occur based on the best available scientific information. That information should be incorporated into specific projections for ecosystem and species sustainability, so that the revised forest plan and plan components can address the vulnerability and sustainability of ecosystems and species under probable climate-change scenarios. The WNF assessment should draw on the Forest Service Northern Research Station’s 2015 “Central Appalachians Forest Ecosystem Vulnerability Assessment and Synthesis,”⁶⁰ a detailed assessment of the climate change impacts to forest ecosystems and processes. The WNF assessment should further extrapolate the findings of that report to the potential impacts of these changes to the at-risk species within the Plan area.

Another likely stressor not under the control of the Forest Service is private land development. It manifests itself in the wildland-urban interface (WUI) and the limitations imposed on management there to promote ecological integrity. It is important to identify the areas that have been and are likely to be included as WUI as continuing stressors, and consider their juxtaposition with important habitat for at-risk species. According to Ohio’s State Wildlife Action Plan,⁶¹ housing and urban areas has a “high” threat impact for both forests and for headwater and small inland streams.

Of the stressors and drivers likely to be under the control of the Forest Service within the plan area, Ohio’s State Wildlife Action Plan ranks the following as “high” for forest habitats:

⁶⁰ General Technical Report NRS-146, February 2015.

⁶¹ <http://wildlife.ohiodnr.gov/Portals/wildlife/pdfs/proposed%20rule%20changes/OHIO%202015%20SWAP.pdf>.
Table 19.

- energy production and mining (oil & gas extraction and mining & quarrying) - “can directly damage and destroy forest habitat, and indirectly have negative impacts by altering hydrology and causing chemical contamination”
- Introduction and/or spread of invasive plants and animals

Similarly, for headwater and inland small stream habitats,⁶² the “high” ranking threats that will likely be under the control of the Forest Service within the plan area are:

- Energy production and mining: oil & gas drilling
- Transportation and service corridors: roads and railroads
- Biological resource use: logging & wood harvesting
- Natural system modifications: dams & water management/use
- Pollution: agriculture and forestry effluents
- Climate change and severe weather: habitat shifting and alteration

The Plan assessment should robustly assess each of these stressors and drivers.

4. How has management of the plan area contributed to the current condition?

In order to develop appropriate plan components, it is necessary to understand how management of the plan area has influenced ecological conditions in the past. Management activities should have been identified as stressors in the previous step, and the manner in which those activities are governed by the existing plan should be identified. It is also important to identify ways that the WNF could be managed that would address and mitigate the effects of external stressors like climate change.

5. What scenario is most likely for external future drivers and stressors, including climate change?

The planning handbook invokes “scenario planning” as a tool for assessing stressors.⁶³ For the purpose of this assessment, this simply recognizes that planning must make assumptions about future conditions, and plan components must be developed that will provide for sustainability in the most likely scenario (or the broadest range of scenarios). The assessment must document those assumptions. With respect to climate change scenarios, many reports, including the

⁶² Ibid, Table 17

⁶³ FSH 1909.12, Ch. 10 § 12.31.2, 12.32.2.

Forest Service's 2015 "Central Appalachians Forest Ecosystem Vulnerability Assessment,"⁶⁴ utilize climate change scenarios known as the "B1" (lower emissions) and "A1FI" (higher emissions) scenarios, developed by the Intergovernmental Panel on Climate Change (IPCC) in 2000. In 2013, however, the IPCC developed a new set of scenarios that are less tied to certain technological and sociological assumptions, and instead project four "representative concentration pathways" (RCPs) of radiative forcing, namely +2.6, +4.5, +6.0 and +8.5 watts per square meter by 2100. These new scenarios have been adopted by the U.S. Global Change Research Program and are now the standard in its publications, including the 2017 "Climate Science Special Report: Volume I of the Fourth National Climate Assessment"⁶⁵ and are now considered the best available information on future climate. For practical purposes, there is good correspondence between B1 and RCP +4.5, and between A1FI and RCP +8.5.

The assessment should also consider how current and future patterns of energy use and generation type preferences will influence energy generation opportunities and permit requests. The WNF is already a leader in solar energy generation, with a 302-panel array providing nearly 20% of the Forest Headquarters building's electricity use.⁶⁶ The assessment should consider whether there are additional appropriate areas for solar generation in the WNF, pursuant to FSM sections 2724.15 and 2726.23, including rooftops, parking lots, and mine spoil areas that are not appropriate for restoration to grassland habitats.

6. What will the future trend in ecological conditions be as a result of those drivers and stressors?

In order to facilitate a meaningful need for change analysis and determination, as well as to develop future plan components that are responsive to changing conditions, the assessment should strongly consider the effects of possible future scenarios for stressors and other relevant factors beyond control of the agency (including climate change) on target planning resources (e.g. necessary ecological conditions or key ecosystem characteristics). Likely future scenarios should be systematically applied to the target planning resources, and the scenarios should be based on the best available scientific information.

7. What will the likely future condition be managing under the current plan?

⁶⁴ General Technical Report NRS-146, February 2015

⁶⁵ U.S. Global Change Research Program. <https://science2017.globalchange.gov/downloads/>

⁶⁶ <https://www.sunnyportal.com/Templates/PublicPageOverview.aspx?page=f65ddbe3-b9d3-4c04-98df-13b8add91994&plant=4733c887-d473-4e77-896a-13648df054a5&splang=en-US>

The planning rule provides direction on how to evaluate the information compiled during the assessment about “trends, and their sustainability and their relationship to the land-management plan within the context of the broader landscape.” This provision requires the assessment to evaluate “existing and possible future conditions and trends of the plan area.”⁶⁷ The planning handbook explicitly requires that the assessment, “Describe the current and likely future status of the ecological conditions necessary to meet the requirements of 36 C.F.R. 219.9(b) for each at-risk species, assuming management continues under the current plan.”⁶⁸

Although it is not appropriate for the assessment to determine a need to change plan components, the assessment *should* clearly identify future ecosystem integrity conditions under the current plan (considering likely future environments and stressors) and compare those parameters to reference conditions (NRV or otherwise), so that a meaningful need for change analysis can occur during the planning phase.

⁶⁷ 36 C.F.R. § 219.5(a)(1).

⁶⁸ FSH 1909.12, Ch. 10 § 12.55.3.a.

Appendix 1: State Listed Animals and Species of Concern

Species	Category	State Status	County Occurrence
<i>Accipiter striatus</i> Sharp-shinned Hawk	Bird	Species of Concern	Athens, Lawrence, Noble, Scioto, Washington
<i>Acris crepitans crepitans</i> Eastern Cricket Frog	Amphibian - Frog / Toad	Species of Concern	Athens, Gallia, Hocking, Jackson, Lawrence, Scioto, Vinton
<i>Alasmidonta marginata</i> Elktoe	Invert. - fw bivalve	Species of Concern	Lawrence, Morgan, Scioto, Washington
<i>Ambystoma laterale</i> Blue-spotted Salamander	Amphibian - Salamander	Endangered	Scioto
<i>Ammocrypta pellucida</i> Eastern Sand Darter	Fish	Species of Concern	Athens, Gallia, Hocking, Lawrence, Morgan, Scioto, Vinton, Washington
<i>Ammodramus henslowii</i> Henslow's Sparrow	Bird	Species of Concern	Athens, Jackson, Vinton, Washington
<i>Aneides aeneus</i> Green Salamander	Amphibian - Salamander	Endangered	Lawrence, Scioto
<i>Anguilla rostrata</i> American Eel	Fish	Threatened	Scioto
<i>Brachycentrus numerosus</i>	Insect - caddisfly	Endangered	Athens
<i>Caprimulgus carolinensis</i> Chuck-will's-widow	Bird	Special Interest	Vinton
<i>Carpodacus purpureus</i> Purple Finch	Bird	Special Interest	Washington
<i>Catharus guttatus</i> Hermit Thrush	Bird	Special Interest	Athens
<i>Catocala maestosa</i>	Insect - moth	Special Interest	Hocking
<i>Chytonix sensilis</i>	Insect - moth	Species of Concern	Hocking
<i>Cistothorus palustris</i> Marsh Wren	Bird	Species of Concern	Vinton
<i>Clemmys guttata</i> Spotted Turtle	Reptile - Turtle	Threatened	Athens, Morgan, Vinton
<i>Colinus virginianus</i> Northern Bobwhite	Bird	Species of Concern	Athens, Gallia, Jackson, Lawrence, Noble, Scioto, Vinton, Washington
<i>Coragyps atratus</i> Black Vulture	Bird	Species of Concern	Jackson

<i>Crotalus horridus</i> Timber Rattlesnake	Reptile - Snake	Endangered	Athens, Gallia, Hocking, Jackson, Lawrence, Scioto, Washington
<i>Cycleptus elongatus</i> Blue Sucker	Fish	Threatened	Gallia, Scioto, Washington
<i>Cyclonaias tuberculata</i> Purple Wartyback	Invert. - fw bivalve	Species of Concern	Jackson (extirpated?), Lawrence (extirpated?), Morgan, Scioto, Washington
<i>Dendroica cerulea</i> Cerulean Warbler	Bird	Species of Concern	Athens, Gallia, Hocking, Jackson, Lawrence, Noble, Scioto, Vinton, Washington
<i>Dendroica magnolia</i> Magnolia Warbler	Bird	Special Interest	Athens
<i>Dolichonyx oryzivorus</i> Bobolink	Bird	Species of Concern	Washington
<i>Ellipsaria lineolata</i> Butterfly mussel	Invert. - fw bivalve	Endangered	Gallia, Lawrence (extirpated?), Morgan, Scioto, Washington
<i>Elliptio crassidens</i> <i>crassidens</i> Elephant-ear	Invert. - fw bivalve	Endangered Invert. -	Gallia, Jackson (extirpated?), Lawrence Scioto, Washington
<i>Empidonax minimus</i> Least Flycatcher	Bird	Special Interest	Athens, Jackson, Noble, Scioto
<i>Eptesicus fuscus</i> Big Brown Bat	Mammal	Species of Concern	Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Noble, Perry, Scioto, Vinton, Washington
<i>Erimyzon sucetta</i> Lake Chubsucker	Fish	Threatened	Jackson
<i>Erythroecia hebaridi</i> Hebard's Noctuid Moth	Insect - moth	Endangered	Scioto
<i>Esox masquinongy</i> Muskellunge	Fish	Species of Concern	Monroe, Scioto, Vinton, Washington
<i>Etheostoma tippecanoe</i> Tippecanoe Darter	Fish	Threatened	Hocking, Monroe, Scioto, Vinton, Washington
<i>Euchlaena milnei</i> Milnei's Looper Moth	Insect - moth	Species of Concern	Scioto
<i>Euchloe olympia</i> Olympia Marble	Insect - butterfly	Special Interest	Lawrence
<i>Fagitana littera</i>	Insect - moth	Threatened	Athens
<i>Fundulus diaphanus</i> <i>menona</i> Western Banded Killifish	Fish	Endangered	Washington
<i>Fusconaia ebena</i> <i>Ebonyshell</i>	Invert. - fw bivalve	Endangered	Gallia, Morgan (extirpated?), Scioto, Washington (extirpated?)

<i>Fusconaia maculata maculata</i> Long-solid	Invert. - fw bivalve	Endangered	Gallia, Morgan, Scioto, Washington
<i>Helocordulia uhleri</i> Uhler's Sundragon	Insect - odonate	Endangered	Hocking, Scioto
<i>Hemidactylium scutatum</i> Four-toed Salamander	Amphibian - Salamander	Species of Concern	Athens, Gallia, Hocking, Jackson, Lawrence, Scioto, Vinton
<i>Hemileuca maia</i> Buck Moth	Insect - moth	Species of Concern	Athens, Hocking, Jackson (extirpated?), Morgan, Scioto, Vinton
<i>Heterodon platirhinos</i> Eastern Hognose Snake	Reptile - Snake	Species of Concern	Athens, Hocking, Morgan, Perry, Scioto, Vinton
<i>Hiodon alosoides</i> Goldeye	Fish	Endangered	Lawrence, Scioto
<i>Hydroptila chattanooga</i>	Insect - caddisfly	Species of Concern	Monroe
<i>Hydroptila koryaki</i>	Insect - caddisfly	Threatened	Vinton
<i>Ichthyomyzon bdellium</i> Ohio Lamprey	Fish	Endangered	Vinton, Washington
<i>Ictalurus furcatus</i> Blue Catfish	Fish	Species of Concern	Gallia
<i>Junco hyemalis</i> Dark-eyed Junco	Bird	Special Interest	Morgan
<i>Lampsilis fasciola</i> Wavy-rayed Lampmussel	Invert. - fw bivalve	Species of Concern	Washington (extirpated?)
<i>Lampsilis ovata</i> Sharp-ridged Pocketbook	Invert. - fw bivalve	Endangered Jackson	Gallia, Jackson (extirpated?), Morgan, Scioto, Washington
<i>Lampsilis teres</i> Yellow Sandshell	Invert. - fw bivalve	Endangered	Gallia, Lawrence (Extirpated?), Scioto, Washington (Extirpated?)
<i>Lasionycteris noctivagans</i> Silver-haired Bat	Mammal	Species of Concern	Athens, Monroe, Scioto
<i>Lasiurus borealis</i> Red Bat No 1980	Mammal	Species of Concern	Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Noble, Perry, Scioto, Vinton, Washington,
<i>Lasiurus cinereus</i> Hoary Bat	Mammal	Species of Concern	Lawrence, Monroe, Noble, Scioto
<i>Lasmigona compressa</i> Creek Heelsplitter	Invert. - fw bivalve	Species of Concern	Gallia, Hocking, Jackson, Lawrence, Monroe, Morgan, Noble, Vinton, Washington

<i>Lepisosteus platostomus</i> Shortnose Gar	Fish	Endangered	Scioto
<i>Ligumia nasuta</i> Eastern Pondmussel	Invert. - fw bivalve	Endangered	Morgan
<i>Ligumia recta</i> Black Sandshell	Invert. - fw bivalve	Threatened	Athens, Gallia, Hocking Jackson (extirpated?), Lawrence, Morgan, Scioto, Washington
<i>Macrhybopsis hyostoma</i> Shoal Chub	Fish	Endangered	Gallia, Lawrence
<i>Megaloniaias nervosa</i> Washboard	Invert. - fw bivalve	Endangered	Gallia, Scioto, Washington
<i>Microtus ochrogaster</i> Prairie Vole	Mammal	Species of Concern	Athens, Gallia, Jackson, Lawrence, Morgan, Scioto, Vinton
<i>Microtus pinetorum</i> Woodland Vole	Mammal	Species of Concern	Athens, Hocking (extirpated?), Jackson, Lawrence, Morgan, Scioto, Vinton
<i>Moxostoma carinatum</i> River Redhorse	Fish	Species of Concern	Gallia, Lawrence, Morgan, Monroe, Perry, Scioto, Vinton, Washington
<i>Myotis leibii</i> Eastern Small-footed Myotis	Mammal	Species of Concern	Hocking, Perry
<i>Myotis lucifugus</i> Little Brown Bat	Mammal	Species of Concern	Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Noble, Perry, Scioto, Vinton
<i>Neotoma magister</i> Allegheny Woodrat	Mammal	Endangered	Athens (extirpated?), Hocking, Jackson (extirpated?)
<i>Notropis ariommus</i> Popeye Shiner	Fish	Endangered	Scioto
<i>Notropis boops</i> Bigeye Shiner	Fish	Threatened	Scioto
<i>Noturus eleutherus</i> Mountain Madtom	Fish	Threatened	Morgan, Washington
<i>Noturus stigmosus</i> Northern Madtom	Fish	Endangered	Morgan
<i>Nycticeius humeralis</i> Evening Bat	Mammal	Special Interest	Jackson, Perry
<i>Obliquaria reflexa</i> Threehorn Wartyback	Invert. - fw bivalve	Threatened	Athens, Gallia, Lawrence Morgan, Scioto, Washington
<i>Opheodrys aestivus</i> <i>aestivus</i> Northern Rough Greensnake	Reptile - Snake	Species of Concern	Athens, Scioto, Vinton

<i>Orconectes (Crokerinus) obscurus</i> Allegheny Crayfish	Invert. - decapod	Species of Concern	Monroe, Washington
<i>Percina copelandi</i> Channel Darter	Fish	Threatened	Athens, Gallia, Lawrence, Monroe, Scioto, Washington
<i>Percina evides</i> Gilt Darter	Fish	Endangered	Gallia
<i>Percina shumardi</i> River Darter	Fish	Threatened	Athens, Gallia, Monroe Scioto, Washington
<i>Perimyotis subflavus</i> Tri-colored Bat	Mammal	Species of Concern	Gallia, Jackson, Lawrence, Monroe Noble, Perry, Scioto, Vinton,
<i>Peromyscus maniculatus</i> Deer Mouse	Mammal	Species of Concern	Athens, Gallia, Perry, Scioto, Vinton, Washington
<i>Pleurobema cordatum</i> Ohio Pigtoe	Invert.- fw bivalve	Endangered	Gallia, Lawrence (extirpated?), Monroe (extirpated?), Morgan, Scioto, Washington
<i>Pleurobema rubrum</i> Pyramid Pigtoe	Invert. - fw bivalve	Endangered	Lawrence (extirpated?), Scioto, Washington,
<i>Pleurobema sintoxia</i> Round Pigtoe	Invert. - fw bivalve	Species of Concern	Athens, Gallia Hocking Jackson (extirpated?), Monroe, Morgan, Scioto, Washington
<i>Polyodon spathula</i> Paddlefish	Fish	Threatened	Scioto
<i>Protonotaria citrea</i> Prothonotary Warbler	Bird	Species of Concern	Washington
<i>Pseudotriton montanus diastictus</i> Midland Mud Salamander	Amphibian - Salamander	Threatened	Athens, Gallia, Jackson, Lawrence, Scioto, Vinton
<i>Ptychobranhus fasciolaris</i> Kidneyshell	Invert. - fw bivalve	Species of Concern	Athens (extirpated?), Hocking, Jackson (extirpated?), Morgan, Scioto, Washington
<i>Pyrgus centaureae wyandot</i> Grizzled Skipper	Insect – butterfly	Endangered	Athens, Hocking, Morgan, Vinton
<i>Quadrula metanevra</i> Monkeyface	Invert. - fw bivalve	Endangered	Gallia, Scioto, Washington
<i>Quadrula nodulata</i> Wartyback	Invert. - fw bivalve	Endangered	Scioto
<i>Regina septemvittata</i> Queensnake	Reptile - Snake	Species of Concern	Athens, Hocking, Scioto
<i>Reithrodontomys humulis</i> Eastern Harvest Mouse	Mammal	Threatened	Scioto, Vinton

<i>Rhinichthys cataractae</i> Longnose Dace	Fish	Species of Concern	Washington
<i>Scaphiopus holbrookii</i> Eastern Spadefoot	Amphibian - Frog / Toad	Endangered	Athens, Lawrence, Morgan, Scioto Washington
<i>Scincella lateralis</i> Little Brown Skink	Reptile - Lizard	Species of Concern	Scioto, Vinton
<i>Simpsonaias ambigua</i> Salamander Mussel	Invert. - fw bivalve	Species of Concern	Morgan, Scioto, Washington
<i>Smerinthus cerisyi</i> One-Eyed Sphinx	Insect - moth	Species of Concern	Vinton
<i>Sorex fumeus</i> Smoky Shrew	Mammal	Species of Concern	Athens, Gallia, Hocking Lawrence, Scioto, Vinton
<i>Sorex hoyi</i> Pygmy Shrew	Mammal	Species of Concern	Athens, Hocking, Vinton
<i>Speyeria idalia</i> Regal Fritillary	Insect - butterfly	Endangered	Athens, Gallia, Hocking, Jackson, Monroe, Vinton, Washington
<i>Synaptomys cooperi</i> Southern Bog Lemming	Mammal	Species of Concern	Athens, Gallia, Hocking (extirpated?), Jackson, Lawrence, Scioto, Vinton
<i>Taxidea taxus</i> Badger	Mammal	Species of Concern	Athens, Gallia
<i>Terrapene carolina carolina</i> Eastern Box Turtle	Reptile - Turtle	Species of Concern	Athens, Gallia, Lawrence, Scioto
<i>Truncilla donaciformis</i> Fawnsfoot	Invert. - fw bivalve	Threatened	Athens, Jackson (extirpated?), Morgan, Scioto, Washington
<i>Truncilla truncata</i> Deertoe No	Invert. - fw bivalve	Species of Concern	Athens, Gallia Scioto, Washington
<i>Uniomerus tetralasmus</i> Pondhorn	Invert. - fw bivalve	Threatened	Jackson
<i>Ursus americanus</i> Black bear	Mammal	Endangered	Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Morgan, Noble Perry, Scioto, Vinton, Washington
<i>Villosa lienosa</i> Little Spectaclecase	Invert. - fw bivalve	Endangered	Gallia, Jackson, Lawrence, Scioto, Vinton

Appendix 2: State Listed Plants

SPECIES	State Status	County Occurrence
<i>Aconitum noveboracense</i> Northern Monkshood	Endangered	Hocking
<i>Aconitum uncinatum</i> Southern Monkshood	Endangered	Scioto
<i>Ageratina aromatica</i> Small White Snakeroot	Endangered	Gallia, Jackson, Scioto
<i>Amelanchier sanguinea</i> Rock Serviceberry	Threatened	Hocking
<i>Andropogon glomeratus</i> Bushy Broom-sedge	Endangered	Lawrence
<i>Anomobryum filiforme</i> Common Silver Moss	Endangered	Hocking, Scioto
<i>Arabis pycnocarpa</i> var. <i>adpressipilis</i> Southern Hairy Rock Cress	Potentially Threatened	Athens
<i>Aristida purpurascens</i> Purple Triple-awned Grass	Potentially Threatened	Hocking, Jackson
<i>Asclepias amplexicaulis</i> Blunt-leaved Milkweed	Potentially Threatened	Gallia, Hocking, Jackson, Lawrence, Scioto, Vinton, Washington
<i>Asclepias variegata</i> White Milkweed	Potentially Threatened	Gallia, Jackson, Lawrence, Scioto, Vinton
<i>Asplenium bradleyi</i> Bradley's Spleenwort	Endangered	Athens, Washington
<i>Astragalus canadensis</i> Canada Milk-vetch	Threatened	Monroe, Scioto, Vinton
<i>Aureolaria pedicularia</i> var. <i>pedicularia</i> Woodland Fern-leaved False Foxglove	Endangered	Athens
<i>Botrychium biternatum</i> Sparse-lobed Grape Fern	Endangered	Hocking, Lawrence, Monroe, Scioto, Washington
<i>Botrychium lanceolatum</i> Triangle Grape Fern	Threatened	Hocking
<i>Buchnera americana</i> Bluehearts	Threatened	Jackson
<i>Calamagrostis porteri</i> ssp. <i>insperata</i> Bartley's Reed Grass	Threatened	Jackson, Vinton
<i>Campylostelium saxicola</i> Rock-loving Swan-necked Moss	Endangered	Gallia, Hocking
<i>Canoparmelia amabilis</i> Obed Shield Lichen	Endangered	Washington
<i>Cardamine dissecta</i> Narrow-leaved Toothwort	Potentially Threatened	Athens, Gallia, Hocking, Perry, Washington

<i>Carex albolutescens</i> Pale Straw Sedge	Potentially Threatened	Gallia, Hocking, Jackson, Lawrence
<i>Carex bushii</i> Bush's Sedge	Threatened	Jackson
<i>Carex complanata</i> Flattened Sedge	Threatened	Athens, Gallia, Jackson, Vinton
<i>Carex crinita</i> var. <i>brevicrinis</i> Short-fringed Sedge	Threatened	Jackson, Scioto, Vinton
<i>Carex gigantea</i> Large Sedge	Endangered	Gallia
<i>Carex louisianica</i> Louisiana Sedge	Endangered	Gallia, Jackson
<i>Carex lupuliformis</i> False Hop Sedge	Potentially Threatened	Gallia, Jackson
<i>Carex mesochorea</i> Midland Sedge	Threatened	Lawrence, Perry, Washington
<i>Carex purpurifera</i> Purple Wood Sedge	Threatened	Scioto
<i>Carex reznicekii</i> Reznicek's Sedge	Threatened	Hocking, Jackson, Lawrence, Scioto
<i>Carex straminea</i> Straw Sedge	Potentially Threatened	Jackson
<i>Carex striatula</i> Lined Sedge	Threatened	Lawrence
<i>Chimaphila umbellata</i> Pipsissewa	Threatened	Hocking, Monroe
<i>Chionanthus virginicus</i> Fringe-tree	Potentially Threatened	Gallia, Jackson, Lawrence, Scioto, Vinton
<i>Chrysogonum virginianum</i> Golden-knees	Threatened	Athens, Washington
<i>Cirsium carolinianum</i> Carolina Thistle	Threatened	Athens, Lawrence, Scioto, Vinton
<i>Clintonia umbellulata</i> Speckled Wood-lily	Endangered	Washington
<i>Clitoria mariana</i> Butterfly-pea	Potentially Threatened	Jackson, Scioto, Washington
<i>Collinsonia verticillata</i> Early Stoneroot	Endangered	Scioto
<i>Corallorhiza maculata</i> Spotted Coral-root	Potentially Threatened	Scioto
<i>Corallorhiza wisteriana</i> Spring Coral-root	Potentially Threatened	Athens, Lawrence, Scioto
<i>Corydalis sempervirens</i> Rock-harlequin	Threatened	Athens, Hocking
<i>Crataegus uniflora</i> Dwarf Hawthorn	Potentially Threatened	Gallia, Lawrence, Scioto
<i>Croton willdenowii</i> Willdenow's Croton	Endangered	Jackson
<i>Cuscuta compacta</i> Sessile Dodder	Endangered	Jackson
<i>Cuscuta cuspidata</i> Cuspidate Dodder	Endangered	Lawrence

<i>Cyperus lancastris</i> Many-flowered Umbrella-sedge	Endangered	Jackson
<i>Cyperus refractus</i> Reflexed Umbrella-sedge	Endangered	Gallia, Lawrence
<i>Cyperus retrofractus</i> Rough Umbrella-sedge	Endangered	Jackson
<i>Cystopteris tennesseensis</i> Tennessee Bladder Fern	Potentially Threatened	Athens, Gallia, Hocking, Lawrence, Monroe, Vinton, Washington
<i>Delphinium exaltatum</i> Tall Larkspur	Potentially Threatened	Hocking
<i>Descurainia pinnata</i> Tansy Mustard	Threatened	Scioto
<i>Dibaeis absoluta</i> Pink Dot Lichen	Threatened	Athens, Hocking, Lawrence, Vinton
<i>Dichanthelium lindheimeri</i> Lindheimer's Panic Grass	Threatened	Jackson
<i>Dichanthelium scoparium</i> Velvet Panic Grass	Endangered	Jackson
<i>Dichanthelium villosissimum</i> Villous Panic Grass	Potentially Threatened	Jackson, Lawrence, Scioto, Washington
<i>Dichanthelium yadkinense</i> Spotted Panic Grass	Potentially Threatened	Gallia, Hocking, Jackson, Lawrence, Scioto, Vinton
<i>Dichelyma capillaceum</i> Awned Dichelyma Moss	Endangered	Gallia
<i>Draba brachycarpa</i> Little Whitlow-grass	Endangered	Lawrence
<i>Eleocharis engelmannii</i> Engelmann's Spike-rush	Endangered	Jackson
<i>Eleocharis tenuis</i> Slender Spike-rush	Threatened	Jackson, Monroe
<i>Eleocharis wolfii</i> Wolf's Spike-rush	Endangered	Jackson
<i>Eryngium yuccifolium</i> Rattlesnake-master	Potentially Threatened	Athens, Jackson, Lawrence, Scioto
<i>Erythronium rostratum</i> Golden-star	Endangered	Scioto
<i>Eupatorium album</i> White Thoroughwort	Threatened	Jackson, Scioto
<i>Eupatorium godfreyanum</i> Godfreys Thoroughwort	Endangered	Lawrence
<i>Eupatorium hyssopifolium</i> Hyssop Thoroughwort	Endangered	Jackson
<i>Eupatorium pilosum</i> Rough Boneset	A (sic)	Lawrence
<i>Eurybia surculosa</i> Creeping Aster	Endangered	Scioto
<i>Fissidens hyalinus</i> Filmy Fissidens	Endangered	Hocking, Vinton
<i>Fleischmannia incarnata</i> Pink Thoroughwort	Threatened	Gallia, Lawrence
<i>Gentiana alba</i> Yellowish Gentian	Endangered	Athens, Gallia

<i>Gentiana villosa</i> Sampson's Snakeroot	Endangered	Gallia, Jackson, Lawrence, Scioto
<i>Gentianopsis procera</i> Small Fringed Gentian	Potentially Threatened	Hocking
<i>Gratiola virginiana</i> Round-fruited Hedge-hyssop	Threatened	Gallia, Jackson, Lawrence, Scioto, Vinton
<i>Gratiola viscidula</i> Short's Hedge-hyssop	Potentially Threatened	Gallia, Jackson, Scioto
<i>Helianthus mollis</i> Ashy Sunflower	Threatened	Jackson, Monroe
<i>Heteranthera reniformis</i> Mud-plantain	Endangered	Lawrence
<i>Heuchera longiflora</i> Long-flowered Alum-root	Threatened	Scioto
<i>Heuchera parviflora</i> Small-flowered Alum-root	Threatened	Gallia, Lawrence, Scioto
<i>Heuchera villosa</i> Hairy Alum-root	Endangered	Gallia, Lawrence
<i>Hexalectris spicata</i> Crested Coral-root P	Potentially Threatened	Lawrence
<i>Hypericum denticulatum</i> Coppery St. John's-wort	Endangered	Jackson
<i>Iris verna</i> Dwarf Iris	Threatened	Lawrence, Scioto
<i>Isoetes engelmannii</i> Appalachian Quillwort	Endangered	Gallia, Jackson, Scioto
<i>Isotria medeoloides</i> Small Whorled Pogonia	Endangered	Hocking, Scioto
<i>Juncus interior</i> Inland Rush	Threatened	Jackson
<i>Juncus platyphyllus</i> Flat-leaved Rush	Endangered	Gallia, Scioto
<i>Juncus secundus</i> One-sided Rush	Potentially Threatened	Hocking, Jackson, Scioto, Vinton
<i>Juncus subcaudatus</i> Woodland Rush	Endangered	Jackson
<i>Krigia dandelion</i> Potato-dandelion	Threatened	Jackson
<i>Krigia virginica</i> Virginia Dwarf-dandelion	Threatened	Lawrence
<i>Lactuca hirsuta</i> Hairy Tall Lettuce	Threatened	Lawrence, Scioto
<i>Lathyrus venosus</i> Wild Pea	Endangered	Lawrence
<i>Lechea minor</i> Thyme-leaved Pinweed	Threatened	Athens, Jackson
<i>Lechea tenuifolia</i> Narrow-leaved Pinweed	Potentially Threatened	Athens, Noble, Scioto
<i>Liatris cylindracea</i> Slender Blazing-star	Threatened	Athens
<i>Liatris scariosa</i> Large Blazing-star	Threatened	Scioto

<i>Ligusticum canadense</i> American Lovage	Endangered	Lawrence
<i>Lilium philadelphicum</i> Wood Lily	Endangered	Scioto
<i>Linaria canadensis</i> Old-field Toadflax	Endangered	Washington
<i>Luzula bulbosa</i> Southern Woodrush	Potentially Threatened	Athens, Scioto
<i>Lycopodium lagopus</i> One-coned Club-moss	Endangered	Jackson
<i>Magnolia macrophylla</i> Bigleaf Magnolia	Endangered	Jackson
<i>Magnolia tripetala</i> Umbrella Magnolia	Potentially Threatened	Gallia, Hocking, Jackson, Scioto, Vinton
<i>Malaxis unifolia</i> Green Adder's-mouth	Potentially Threatened	Athens, Gallia, Hocking, Lawrence, Perry, Scioto, Vinton, Washington
<i>Melampyrum lineare</i> Cow-wheat	Endangered	Hocking
<i>Opuntia humifusa</i> Common Prickly Pear	Potentially Threatened	Gallia, Hocking, Lawrence, Washington
<i>Orbexilum pedunculatum</i> False Scurf-pea	Potentially Threatened	Jackson, Scioto, Vinton
<i>Packera paupercula</i> Balsam Squaw-weed	Threatened	Lawrence
<i>Parmotrema madagascariaceum</i> Madagascar Ruffle Lichen	Endangered	Vinton
<i>Paspalum repens</i> Riverbank Paspalum	Threatened	Lawrence, Scioto
<i>Passiflora incarnata</i> Maypop	Threatened	Gallia, Lawrence
<i>Penstemon canescens</i> Gray Beard-tongue	Threatened	Lawrence
<i>Penstemon pallidus</i> Downy White Beard-tongue	Threatened	Athens, Gallia, Jackson, Lawrence, Vinton, Washington
<i>Phacelia bipinnatifida</i> Fern-leaved Scorpion-weed	Potentially Threatened	Scioto
<i>Phacelia covillei</i> Blue Scorpion-weed	Endangered	Lawrence
<i>Phacelia dubia</i> Small-flowered Scorpion-weed	Endangered	Scioto
<i>Phaseolus polystachios</i> Wild Kidney Bean	Potentially Threatened	Jackson, Lawrence, Scioto, Vinton, Washington
<i>Phegopteris connectilis</i> Long Beech Fern	Potentially Threatened	Hocking, Jackson
<i>Phyllanthus caroliniensis</i> Carolina Leaf-flower	Threatened	Jackson, Scioto

<i>Piptochaetium avenaceum</i> Black-seeded Needle Grass	Endangered	Lawrence
<i>Plagiothecium latebricola</i> Lurking Leskea	Threatened	Hocking
<i>Platanthera ciliaris</i> Yellow Fringed Orchid	Threatened	Hocking, Scioto, Washington
<i>Pleopeltis polypodioides</i> Little Gray Polypody	Potentially Threatened	Athens, Hocking, Lawrence
<i>Pluchea camphorata</i> Camphor-weed	Endangered	Washington
<i>Polygala curtissii</i> Curtiss' Milkwort	Endangered	Jackson
<i>Polygala incarnata</i> Pink Milkwort	Threatened	Jackson, Lawrence, Scioto
<i>Potamogeton pulcher</i> Spotted Pondweed	Endangered	Jackson, Scioto
<i>Potamogeton tennesseensis</i> Tennessee Pondweed	Threatened	Jackson, Scioto, Vinton
<i>Prenanthes trifoliolata</i> Gall-of-the-earth	Endangered	Scioto
<i>Prosartes maculata</i> Nodding Mandarin	Threatened	Scioto
<i>Pycnanthemum verticillatum</i> var. <i>pilosum</i> Hairy Mountain-mint	Threatened	Hocking
<i>Quercus falcata</i> Spanish Oak	Threatened	Gallia, Jackson, Lawrence, Scioto
<i>Quercus marilandica</i> Blackjack Oak	Potentially Threatened	Gallia, Lawrence, Scioto
<i>Ramalina farinacea</i> Dotted Ramalina	Endangered	Athens, Lawrence
<i>Ramalina intermedia</i> Rock Ramalina	Endangered	Gallia, Hocking
<i>Ramalina pollinaria</i> Chalky Ramalina	Threatened	Gallia, Hocking, Jackson, Vinton, Washington
<i>Ranunculus pusillus</i> Low Spearwort	Threatened	Jackson, Scioto
<i>Rhododendron calendulaceum</i> Flame Azalea	Endangered	Jackson
<i>Rhododendron maximum</i> Great Rhododendron	Threatened	Hocking, Jackson, Scioto
<i>Rhododendron periclymenoides</i> Pinxter-flower	Threatened	Gallia, Lawrence, Monroe, Scioto
<i>Rosa blanda</i> Smooth Rose	Potentially Threatened	Scioto
<i>Saccharum alopecuroides</i> Silver Plume Grass	Endangered	Gallia, Lawrence, Scioto
<i>Sagina decumbens</i> Southern Pearlwort	Endangered	Scioto

<i>Salix caroliniana</i> Carolina Willow	Potentially Threatened	Scioto
<i>Scleria oligantha</i> Tubercled Nut-rush	Potentially Threatened	Lawrence, Scioto
<i>Scleria pauciflora</i> Few-flowered Nut-rush	Potentially Threatened	Hocking, Jackson, Scioto
<i>Scleria triglomerata</i> Tall Nut-rush	Potentially Threatened	Gallia, Jackson, Lawrence
<i>Scutellaria saxatilis</i> Rock Skullcap	Threatened	Gallia, Lawrence, Monroe, Scioto, Vinton, Washington
<i>Sericocarpus linifolius</i> Narrow-leaved Aster	Threatened	Jackson, Scioto
<i>Sida hermaphrodita</i> Virginia-mallow	Potentially Threatened	Gallia, Lawrence, Scioto
<i>Silene caroliniana</i> ssp. <i>wherryi</i> Wherry's Catchfly	Threatened	Scioto
<i>Silphium laciniatum</i> Compass-plant	Endangered	Lawrence
<i>Solidago odora</i> Sweet Goldenrod	Threatened	Jackson, Lawrence, Scioto
<i>Solidago sphacelata</i> False Goldenrod	Endangered	Lawrence
<i>Solidago squarrosa</i> Leafy Goldenrod	Threatened	Scioto
<i>Spermacoce glabra</i> Smooth Buttonweed	Potentially Threatened	Gallia, Lawrence, Scioto, Washington
<i>Sphenopholis obtusata</i> var. <i>obtusata</i> Prairie Wedge Grass	Threatened	Jackson
<i>Spiraea virginiana</i> Appalachian Spiraea	Endangered	Scioto
<i>Spiranthes lucida</i> Shining Ladies'-tresses	Potentially Threatened	Scioto
<i>Stenanthium gramineum</i> Feather-bells	Potentially Threatened	Gallia, Jackson, Lawrence, Scioto
<i>Symphyotrichum oblongifolium</i> Shale Barren Aster	Threatened	Hocking
<i>Triadenum tubulosum</i> Large Marsh St. John's-wort	Threatened	Gallia, Jackson, Scioto, Vinton
<i>Triadenum walteri</i> Walter's St. John's-wort	Threatened	Gallia, Jackson
<i>Trichomanes boschianum</i> Appalachian Filmy Fern	Endangered	Hocking
<i>Trichostema dichotomum</i> var. <i>lineare</i> Narrow-leaved Bluecurls	Endangered	Jackson
<i>Trifolium stoloniferum</i> Running Buffalo Clover	Endangered	Hocking, Jackson, Lawrence, Vinton

<i>Uniomerus tetralasmus</i> Pondhorn	Threatened	Jackson
<i>Verbesina occidentalis</i> Yellow Crown-beard	Endangered	Gallia, Lawrence
<i>Viburnum rufidulum</i> Southern Black-haw	Potentially Threatened	Scioto
<i>Viola lanceolata</i> Lance-leaved Violet	Potentially Threatened	Athens, Hocking, Jackson, Perry, Scioto
<i>Viola pedata</i> Birdfoot Violet	Threatened	Scioto
<i>Viola primulifolia</i> Primrose-leaved Violet	Endangered	Jackson, Scioto
<i>Viola tripartita</i> var. <i>glaberrima</i> Wedge-leaved Violet	Threatened	Athens, Scioto
<i>Xyris torta</i> Twisted Yellow-eyed-grass	Threatened	Scioto