

BACKGROUND

Pine Barrens represent unique habitats that support large numbers of Species of Greatest Conservation Need. Many Northeast states identified pine barrens as a top priority for conservation in their Wildlife Action Plans. The U.S. Fish and Wildlife Service (FWS) has prioritized pine barrens to recover the Karner blue butterfly, and recently the frosted elfin butterfly was petitioned for listing under the Endangered Species Act (ESA).



Blue lupine (Lupinus perennis L.) is the obligate host plant of the Karner blue butterfly and frosted elfin butterfly.

PROCESS...

1. Outline

Identify the problem, the resource of interest and what actions need to be implemented

The conservation community has not formally organized an effort to conserve Pine Barrens, but the FWS is mandated to conduct a status assessment for the frosted elfin butterfly, and consideration of opportunities to pre-empt the need list species through collaborative strategies is a necessary component of status assessments. Arising from policies guiding the evaluation of conservation efforts for ESA candidates, habitat, either actual or potential, must be explicitly mapped, considering their current conservation status on public and private land, and opportunities to conduct restoration.

Pine barrens form under a variety of conditions where sandy soils are deposited by rivers or glaciers. Without disturbances such as extreme drought and fire, they typically transition to oak forests. Because of their unique structure, they harbor diverse wildlife, and are expected to benefit from a variety of forest management practices and controlled burning to restore open canopy. Some examples of pine barrens wildlife include prairie warbler, eastern whip-poor-will, box turtle, tiger salamander, eastern hog-nosed snake, pine barrens treefrog, northern pine snake, Karner blue butterfly, frosted elfin butterfly, moths such as pine woods underwing, barrens dagger moth, Barrens itame, Coastal barrens buckmoth, Pine barren underwing, pine barren zale.

2. Define

Identify important aspects to consider while you are investigating

Nature's Network has identified the association of hundreds of SGCN with ecological systems, including many of the pine barrens species listed above. Core Habitats for Imperiled Species identifies the most important habitats for SGCN; these sites are also the most intact sites for conservation. Opportunities for pine barrens protection can be identified by finding areas of overlap between key pine barrens ecosystems and Core Habitats, and further assessed using Secure Lands data to find protected and unprotected opportunities. Typical pine barrens ecosystem types are described in the [Northeast Habitat Guide](#):

- North Atlantic Coastal Plain Pitch Pine Barrens (page 55)*
- Northeastern Interior Pine Barrens (page 47)*
- North Atlantic Coastal Plain Pitch Pine Lowland (page 155)*

Many more ecological systems can support pine barrens species, but may need restoration. Pine barrens associates generally require open canopy, dry soil, and disturbance--typically fire--to create and perpetuate their niche. Sandy soils, whether they are deposited by rivers or glaciers, foster such conditions. Species we recognize

as pine barrens associates, therefore, occur in many ecosystems that formed and are maintained (or not) in dissimilar landscapes by unique processes. For example, and not listed below, are lowland swamps and bogs that occur in sandy glacial outwash plains, which, due to the porosity of sand, can vacillate between dry pine barrens conditions and wetter ecosystems, depending on the most recent pattern of meandering riverine movement and flooding. The following oak dominated systems have high potential for restoration of pine barrens species and are also described in the [Northeast Habitat Guide](#).

- North Atlantic Coastal Plain Hardwood Forest (page 51)*
- Central Appalachian Dry oak-Pine Forest (page 59)*
- Northeastern Coastal and Interior Pine-Oak Forest*
- Northeastern Interior Dry-Mesic Oak Forest (page 57)*
- Southern Atlantic Coastal Plain Dry-Mesic Forest (108)*
- Southern Atlantic Coastal Plain Upland Longleaf Pine Woodland (69)*
- Southern Appalachian Oak Forest (63)*
- Southern Piedmont Dry Oak-Pine Forest (page 65)*
- Allegheny-Cumberland Dry Oak Forest and Woodland (67)*



Many pine barrens species, include blue lupine, require fire for habitat regeneration.

The layer called Habitat Condition for Imperiled Species, from which Core Habitats for Imperiled Species is derived, includes examples of pine barrens and related systems and ranks them according to their condition. In the habitat condition analysis, the condition is primarily measured according to the influence of human infrastructure. As described above, in Core Habitats, the most intact sites with potential to support pine barrens species are well

represented in the top 1/3 of the values in this layer. However, for the bottom 2/3 of Habitat Condition, management and restoration may be necessary to realize site potential for pine barrens. Candidate sites should be evaluated to detect remnant populations, fire history, and proper soil conditions before planning restoration. Secured lands data may be used to differentiate private and public lands and to evaluate the management potential on secured land, which may be a limiting factor for restoration.

3. Explore

Identify specific opportunities by integrating or overlaying the data

Exercises:

1. Please navigate to the [Northeast Habitat Guide](#):

http://rcngrants.org/sites/default/files/news_files/Northeast%20Aquatic%20and%20Terrestrial%20Habitat%20Guide.pdf

Alternatively, on www.naturesnetwork.org, click on the resources tab and follow the link to Northeast Habitat Guide.

2. Please scroll to the Table of Contents in the Northeast Habitat Guide (page vi). Here, macrogroups are listed. Macrogroups are groups of related ecological systems, which are fully listed for each group beginning on page 10. Refer to North Atlantic Coastal Plain Pitch Pine Barrens (page 55) to become familiar with the information available on the pine barrens systems listed above.

3. On www.naturesnetwork.org, go to the Data and Tools tab then click "see The Big Picture". You will be directed to Data Basin. Scroll down and select "Nature's Network Conservation Design". Use the "Add To" button at the top of the screen to add Nature's Network to a new map. It will take a few moments for the map to load. Click the layer tab on the left to view the layers displayed; you can use this area to move layers up and down and change the display. On the right is a map legend.

4. Click on the "Locate" button at the center of the tool bar above the map display window. A dialogue box labelled "Go to Location" will appear. Type "Montague MA" in the address window. Press submit. The tool will search for the location and return a list of matching places. Click on "Montague, MA, USA". Press "zoom" several times for a closer view.

5. Now we will add a Pine Barrens ecosystems layer. Click on "add datasets", shown at the top of the list of layers in the layer tab at the left side of the screen. A search window will open. Enter "pine barrens" in the search bar, then press "search". In the list of datasets that are returned by the search engine, hold your mouse over the map icon for "Terrestrial Habitat Classification (DSLland 3.1), Pine Barrens", then click on it to select it. Next, scroll down to the bottom of the page and click on "add items". The Terrestrial Habitat Classification (DSLland 3.1) is displayed with a layer file that presents several ecosystem types that are relevant for Pine Barrens, without showing all of the ecosystems mapped for the Northeast region. The Montague pine barrens are part of Nature's Network. Turn off Nature's Network to see the Pine Barrens more clearly. A legend is shown on the right; in green are the typical Pine Barrens ecosystems characterized by pitch pine and scrub oak. Shown in brown are oak and oak-pine forests that can support many of the species that utilize pine barrens--if an intact fire regime is maintained. Without fire, pitch pine barrens tend to mature to oak and pine forests in all but the

driest conditions, and the habitat of many fire dependent species are lost with this transition. For this reason, many species thought of as pine barrens obligates are at risk, and require restoration of mature forests to early successional stages.

6. Now we will compare the Pine Barrens layer to DSLand3.1 and the Northeast Terrestrial Habitat Classification. Click on "add datasets", shown at the top of the list of layers in the layer tab at the left side of the screen. A search window will open. Enter "northeast terrestrial" in the search bar, then press "search". In the list of datasets that are returned by the search engine, hold your mouse over the map icon for "Terrestrial Habitat, Northeast ", then click on it to select it. Find "Terrestrial and Aquatic Habitat Map (DSLland), Version 3.1, Northeast" and select it. Next, scroll down to the bottom of the page and click on "add items". Your map will open and the 2 new layers will appear on the layers tab on the left of your display. Toggle each on and off to see that both overlap the pine barrens map. They map the same habitats, but DSLand 3.1 has added roads to create a complete land cover. All three maps show pine barrens, but the pine barrens map has a customized display to highlight pine barrens. Now you can remove the two versions of the Terrestrial Habitat map by clicking the arrow to the right of each and selecting "remove".

7. Next we will look more closely at opportunities to restore habitat for Species of Greatest Conservation Need (SGCN) in the Montague pine barrens using Nature's Network. Use the "add datasets" tool we just learned about, shown at the top of the list of layers in the layer tab at the left side of the screen. You will need to select "modify search" if the results from your last search are still shown. When the search window opens, enter "imperiled species" in the search bar, then press "search". In the list of datasets that are returned by the search engine, hold your mouse over the map thumbnail for "Habitat Condition for Imperiled Species, Northeast U.S.", then click on it to select. Find "Core Habitat for Imperiled Species, Northeast U.S." and select it. Next, scroll down to the bottom of the page and click on "add to map". Your map will open and the 2 new layers will appear on the layers tab at the left of your display.

8. You can change the order of layers by left-clicking to grab and drag a layer to the desired position. Make sure the Core Habitat layer is on the top and Pine Barrens is on the bottom. By turning Core Habitat and Nature's Network Conservation Design on and off, you can see that this layer is simply a subset of the Habitat Condition layer, included in the Nature's Network Conservation Design to identify the most intact examples of the most important habitats for imperiled species. Turn off Core Habitat and Nature's Network Conservation Design, then turn on Habitat Condition and Pine Barrens and look at the legend on the right. In addition to the most intact 1/3 (the same as Core Habitats), Habitat Condition displays habitats that are less intact, possibly in need of restoration. By pressing the arrow to the right of Habitat Condition, then selecting "transparency", and setting transparency to 50%, you can see that pine barrens overlap with Core Habitats, and that some of the surrounding habitats have restoration potential. Alternatively, use the swipe tool to look at restoration opportunities. The fact that pine barrens are included in Core Habitats means that high concentrations of Species of Greatest Conservation Need have been documented in pine barrens. Here in Montague, many rare Lepidoptera are well-documented.

9. Now we will investigate another example of pine barrens. Use the "locate" tool, found in the center of the tool bar at the top of your map display. Search for "Rome Sand Plains". Select "Rome Sand Plains" or "Rome Sand Plains Unique Area" when it appears in the search window and then zoom in. The map should still have Habitat Condition set at 50% transparency. Toggle Core Habitat and Habitat Condition or use the swipe tool to see that Nature's Network has identified the most intact areas and opportunities for restoration.

10. Use the "add dataset" tool to search for "Secured Lands", then select "Secured Lands,

2014, Eastern U.S.", and scroll down to add the layer to your map. Coupled with the Secured Lands, use the layers to find opportunities to protect pine barrens and to restore them. Use the "identify" button to identify the secured parcels on the map. First click on the circle with an "i", located on the toolbar. It will change to white, then you can click anywhere on the map to find information derived from the map layers that you have displayed, such as ownership of secure parcels. Find out who owns the Rome Sand Plains Natural Area. Select the Secured Lands records from the list that appears. Close the identify window. To print this map, click the export button (second from left on tool bar), then export as a pdf. **This map could be used to approach landowners or land trusts to discuss protection or restoration opportunities for pine barrens.**

11. If your map does already show a Topography basemap, turn on the Topography basemap by scrolling down to the bottom of your list of layers, clicking on the Basemaps directory, and selecting "Topography". Next, turn off all other layers and find Hogsback Road. Switch the basemap to imagery. **On the South side of Hogsback Road are some old fields that have been or are in the process of being restored to support blue lupine and dependent Lepidoptera. Zoom in to see these areas. Using imagery in combination with the Nature's Network data, you could investigate the area to find other restoration opportunities.**

12. Use the "locate" tool to find Hurlock, MD. Replace the Imagery basemap with Topography. Turn off all layers but Secured lands and Pine Barrens. Use the "identify" button to identify the secured parcels east of Hurlock--find the "Chesapeake Forest Lands". You may need to zoom out to find them. Drag the "Pine Barrens" layer on top of "Secured Lands". Pan and zoom to center the Chesapeake Forest Lands. Notice that in this area, only variants of dry oak-pine Forest are mapped, but some occur on state land. Recall that pine barrens and other open savannah-like habitats gradually progress to oak-pine forests when natural succession is unchecked by fire and other disturbances. When species' original habitats have changed significantly, it can be difficult to predict opportunities for conservation on the landscape. Turn on "Habitat Condition" with "Pine Barrens" to see opportunities mapped by Nature's Network--the data predict that habitats preferred by SGCN are present. Note: we have confirmed that in this vicinity, there are historic and/or current records of species that depend on fire and pine barrens associates. **Oak forests in the area have potential for restoration, but it is likely that the historic habitats were savannahs, not true pine barrens. State Land Managers could use this map to plan habitat restoration.**

13. Now we will use the Prioritization Tool to demonstrate a prioritization scenario for a pine barrens species, the frosted elfin butterfly. On www.naturesnetwork.org, go to the Data and Tools tab then click "Identify Priorities". Beneath the center box, click "Get Started". When the tool opens, click "Let me get started".

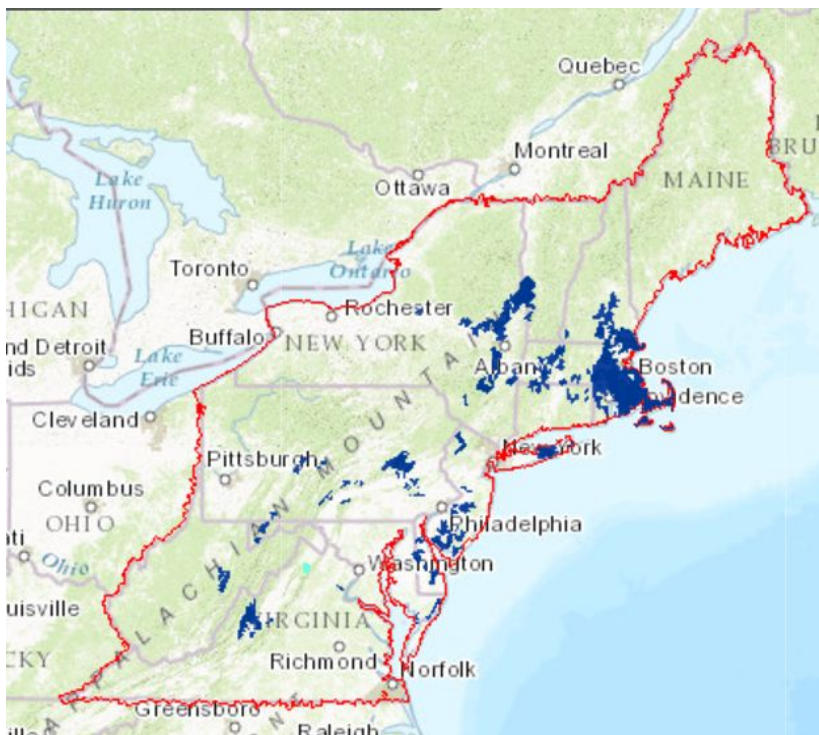
14. Open the "Parameters" tab at the right, then follow these steps:

- Under "Select Geography", select "Species Ranges" and scroll down to *Callophrys Irus* (the Frosted Elfin butterfly);
- Under "Select Planning Unit", make sure USGS HUC 12 is shown;
- In the "Metrics" Pane, click the drop down for species, and select the first two shown, "SGCN condition top 1/3", and "SGCN condition top 2/3"; next scroll down through the list to the heading "Priority Species Habitat" and scroll further to select "Callrus habitat suitability";
- In the "Metrics" Pane, click the drop down for land use, then use the the search window to type "central", then select "Central Appalachian Dry Oak-Pine Forest".
- The Specify Weights pane should now display the four metrics we selected. Enter the

weights as shown below.

SGCN condition top 1/3 ?	<input type="text" value="Positive"/>	1	<input type="button" value="Remove"/>
SGCN condition middle 1/3 ?	<input type="text" value="Positive"/>	1	<input type="button" value="Remove"/>
Callrus habitat suitability ?	<input type="text" value="Positive"/>	3	<input type="button" value="Remove"/>
Central Appalachian Dry Oak-Pine Forest ?	<input type="text" value="Positive"/>	2	<input type="button" value="Remove"/>

- Once you have selected metrics and entered weights, select "Get Results". When the prioritized map appears, use the percentile rank slider tool to view the highest ranked opportunities. The map should now look like this.



4. Reflect

Consider other possibilities by comparing and contrasting different scenarios and what you might want to do next