

Determining the Ecological Context



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- Step 1. Locate priorities at the landscape scale.
- Step 2. Locate priorities at the species and community scale.
- Step 3. Identify the components.

Including Community Values

- Step 4. Identify areas of high public value.
- Step 5. Compare ecological and community values.

Developing and Choosing Options

- Step 6. Evaluate status and determine options.
- Step 7. Evaluate and choose options.

While the maps in Part I of this guide highlight many ecologically important features, it can be difficult to determine just what to do with that knowledge. Chances are that a good percentage of your town's land area is covered by one feature or another, and protecting all areas highlighted by all inventory maps simply isn't feasible. As a planner, do you focus on habitat for [wide-ranging species](#), or clean water? [Vernal pools](#) or rare [physical landscapes](#)? Clearly all are ecologically important, but their relative importance can't be compared. They are important for different reasons.

Luckily, there are methods of prioritizing that don't rely on choosing one component instead of another. Rather than focusing on individual landscape elements as we did in Part I, we will now help you

identify priority locations. In other words, our approach in this section asks: Which locations in your town are most ecologically essential? In which areas would a substantial change in land use most impact the region's ecological function?

This concept of ecological function requires a holistic view. Instead of isolating components from one another, an ecologically functional landscape requires that features work together and processes are maintained. Safe [wildlife road crossings](#) are important only if high-quality habitat remains on either side of the road. A [wetland](#) or lake loses value if the stream flowing into it is impaired. When choosing conservation strategies, we must remember that protecting a vernal pool while ignoring the surrounding habitat defeats the purpose, just as impact to one

section of river may affect water quality downstream, regardless of conservation measures implemented there.

To identify the locations most important for ecological function, we examine the ecological setting at two scales: the “landscape scale” and the “species and community scale.”

Landscape scale priorities include forest networks, waterways and their floodplains, and significant physical landforms. They include the locations with the highest biodiversity and the areas that connect and protect these locations to provide resilience. They outline the habitat used by most Vermont species and allow for movement as the climate changes. While they cover substantial acreage in many Vermont towns, priorities at this scale focus on pattern, and they are generally compatible as working lands and with recreational activities. They can therefore be managed to accommodate many values of a community. Step 1 outlines these locations.

Step 2 zooms in to identify priorities at the species and community scale. These priorities are also important for maintaining biodiversity, but they tend to be smaller and more specific to a handful of species, so they can be overlooked at the landscape scale. These include the locations where rare plants and animals have been found, wetlands, or habitats like vernal pools or forests rich in wildlife food resources. At this closer scale, human activities are much more likely to interfere with function, and these locations should be handled with greater caution.

In Step 3 the inventory maps of Part I will be used in your planning efforts. Once you have identified priority locations in steps 1 and 2, you can look back at individual components to determine which are present in high-priority locations. Eventually, it is these components that will guide you toward particular conservation strategies.

Step 1: Locate Landscape Priorities

Let’s start with the big stuff: the forest networks, the waterways, and the physical landforms that support them. These are the building blocks for nearly all ecological processes. By outlining these, we can effectively paint a picture of the locations most needed to maintain [ecological function](#).

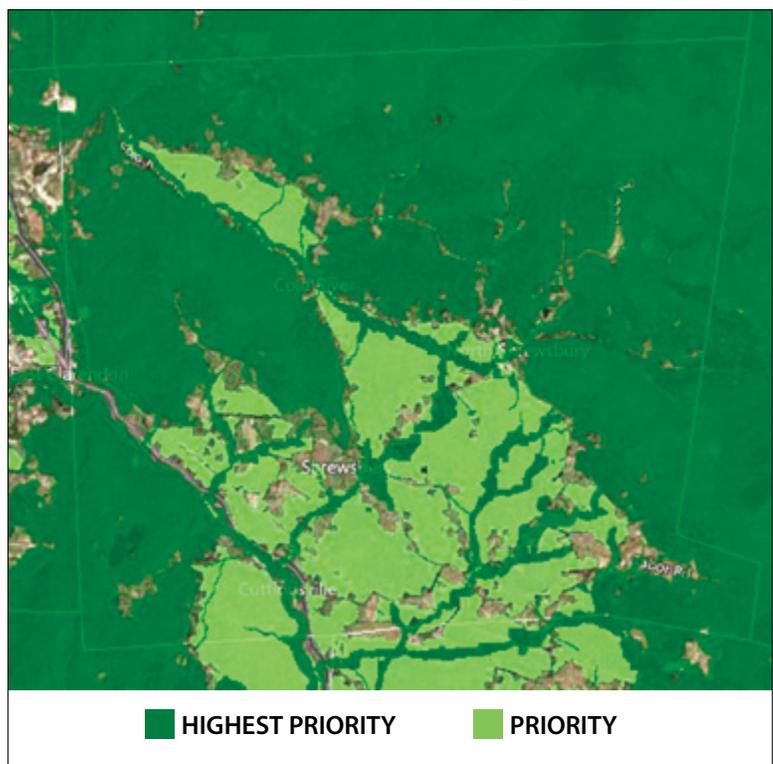
To the right, the map you see is the two-tone backdrop to Map 7. You can also find it in [BioFinder](#), where you can identify which components constitute highlighted areas.

This map shows a network of the most important components included in the following datasets, categorized into “highest priority” and “priority” areas:

- ▶ Interior Forest Blocks
- ▶ Physical Landscape Diversity
- ▶ Connectivity Blocks
- ▶ Riparian Wildlife Connectivity
- ▶ Surface Waters and Riparian Areas

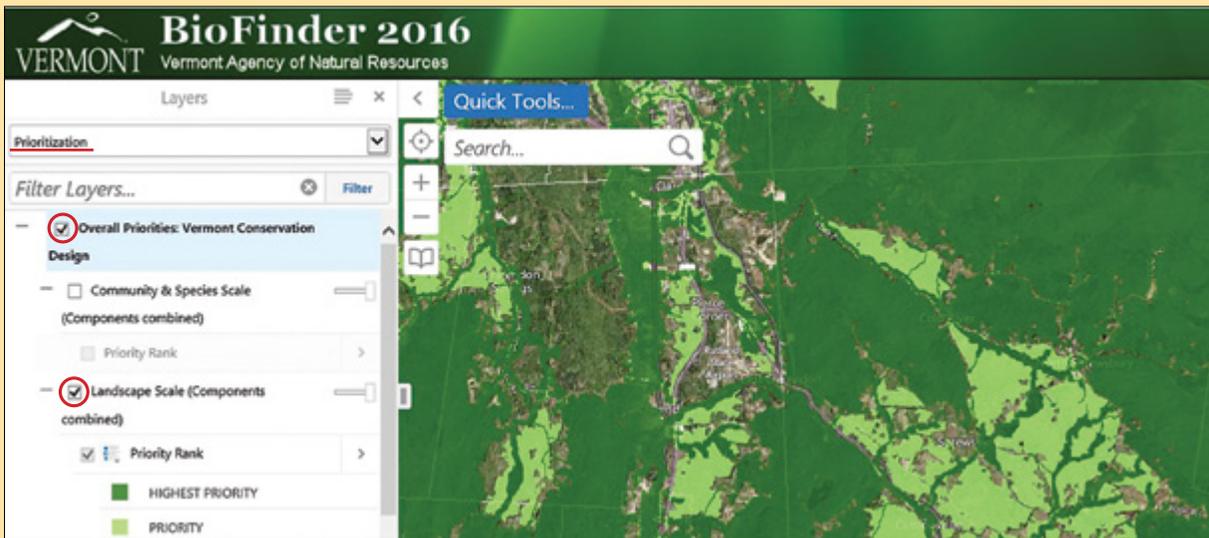
Instead of looking at each component individually, we use Step 1 to examine them en masse, identifying the network of lands and waters necessary to maintain Vermont’s ecological function. By doing this, we can divide locations into three classes: highest priority, priority, and those that don’t contribute significantly to the network. Together, this network encompasses the majority of Vermont species and habitats and provides resilience for a changing climate.

When prioritizing for conservation, consider focusing your strongest efforts on the areas mapped as highest priority on this map. Priority lands can be considered next, and those not mapped as either may be—ecologically—the best locations to focus development efforts. However, we won’t get too involved in this now; we’ll collect and evaluate possible implementation strategies in Step 5. To learn more about the data and scientific process that went into creating this layer, see Map 7.



Using BioFinder in Step 1

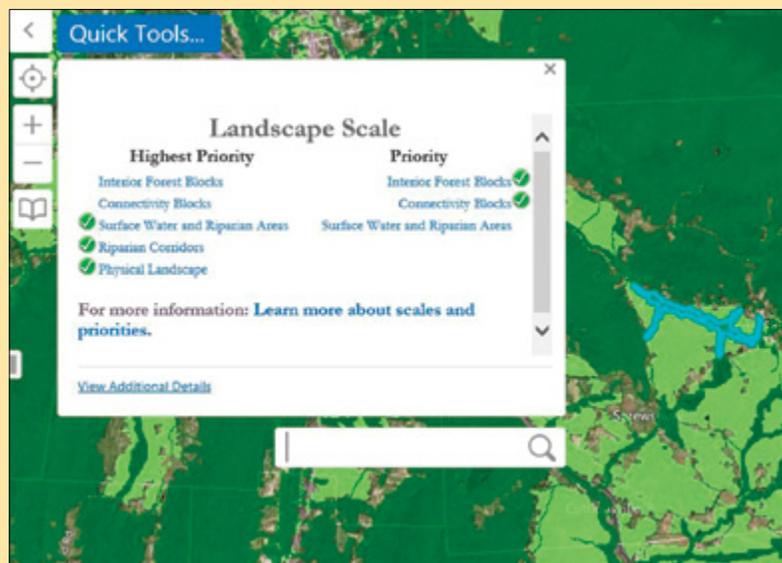
1. Open the BioFinder map. Make sure the **Prioritization** theme is selected.
2. Double click on your area of interest to zoom in, and continue this process until you can see the entire area at the closest range possible.
3. Make sure that the box next to **Overall Priorities: Vermont Conservation Design** is checked, and also the box next to **Landscape Scale (Components combined)**. **Highest Priority** locations will appear in dark green, and **Priority** locations will appear in light green. Those areas on which you can still see the background aerial photo lack priority and highest priority known ecological components.
4. To see only the landscape scale priorities, click in any additional checked boxes to turn them “off.”



BioFinder has a simple tool to help identify which components are most important at any chosen location within the network. With the map open on your screen, point your cursor at a location of interest. Click once on that location and an Identification Box will pop up.

This box provides information about all map layers that are turned on and mapped in your chosen location. When **Landscape Scale** priorities are turned on, all possible components are listed, with a check indicating presence.

From this box, you can learn more about each component by clicking on the component name. A separate tab will open in your browser with a document describing the component, its ecological importance, and information about how the component was mapped.



Mapping Landscape Priorities

In many towns, landscape priorities cover broad acreage. Mapped for their ecological importance, these lands also constitute much of Vermont's working and rural landscape.

While large-scale development or intensive human land use can diminish the ecological value of these areas, many human activities and land uses can be compatible, including thoughtful forest management, many forms of recreation, and even some carefully placed development. Generally speaking, strategies seeking to avoid fragmentation and encourage working forests are compatible solutions.

Step 2: Locate Community and Species Priorities

Now, let's zoom in. While landscape priorities give us the network in which most ecological interactions occur, some species or habitats are so small or have such specialized needs that they are worth protecting where they occur, even if they are not located within the landscape network. In Step 2, we add those habitats important to species and communities of conservation concern in Vermont. While often small in area, these locations are equally important for maintaining regional biodiversity and healthy fish and wildlife populations. For example, wildlife crossings are locations where wide-ranging mammal species such as bear, bobcat, and fisher are most likely to traverse roads as they travel to meet daily or seasonal dietary needs or disperse to find mates. If these crossing areas do not remain available, some populations may not persist even where other habitat needs are present.

You can identify these locations, as mapped by Vermont biologists at the state level, using Map 7 or in

BioFinder, where components have been categorized as "Highest Priority" or "Priority." This information is displayed on the printed maps atop the areas identified in Step 1.

The areas mapped at this scale include the following:

- ▶ Wildlife Road Crossings
- ▶ Vernal Pools
- ▶ Wetlands
- ▶ Grasslands and Shrublands
- ▶ Mast Stands
- ▶ Rare Species
- ▶ Uncommon Species
- ▶ Rare Natural Communities
- ▶ Uncommon Natural Communities
- ▶ Common Natural Communities¹

As mentioned in Part I of this guide, these datasets represent what we know is present, but there are certainly omissions. For example, we have not inventoried every parcel in the state for every rare species.

As you examine the locations of resources on this map, pay special attention to where they fall in relation to the landscape scale network in Step 1. When community and species priorities are located within larger blocks of forest or water, they can be used to elevate the priority ranking of that larger block. Many strategies for conserving the larger blocks will then benefit the community and species priorities, too. We'll go into detail on choosing possible strategies in Step 6.

Where community and species priorities are located outside the network identified in Step 1, your community may want to consider separate conservation strategies. Because community and species priorities generally encompass much smaller acreage, they are often more vulnerable. For some, a seemingly minor

Defining Scale

The "**Community Scale**" refers to the scale at which assemblages of plants and animals interact with one another, with their physical environment, and with the natural processes that commonly affect them. For example, a wetland would be included at this scale due to its association with particular physical features, plants, and wildlife that function together as a community.

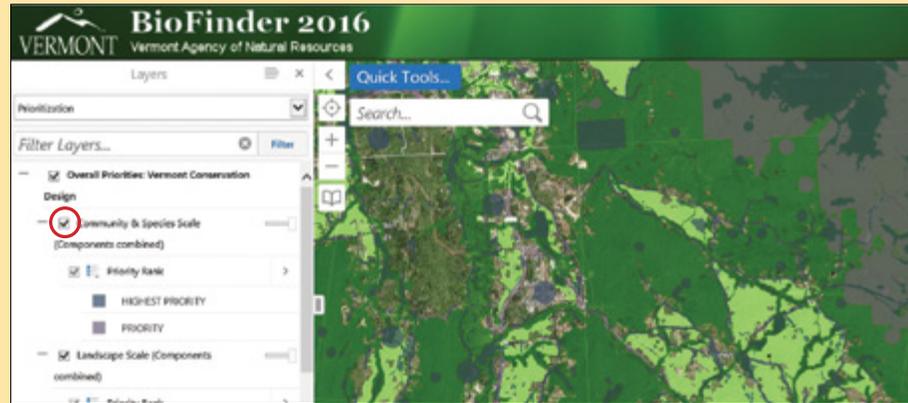
The "**Species Scale**" includes those habitats necessary for the survival of specific fish, wildlife, and plants. For example, wildlife crossings are locations where wide-ranging mammal species such as bear, bobcat, and fisher are likely to cross roads as they travel to meet their daily or seasonal dietary needs, disperse to find mates, or fulfill other requirements. While small in size relative to community or landscape-scale features such as wetlands or forest blocks, these locations are essential for maintaining biodiversity across the state or region.

change in land use could wipe out an entire patch of habitat—a [vernal pool](#), for example, or a [mast stand](#). And although the components themselves may cover little acreage, the processes altered by a single loss may change food webs, impact disease regimes, or alter

migration or dispersal patterns across the ecosystem. Where Community and Species scale priorities fall outside Step 1 priorities, they are therefore generally places to consider focusing more direct conservation measures, due to their sensitivity.

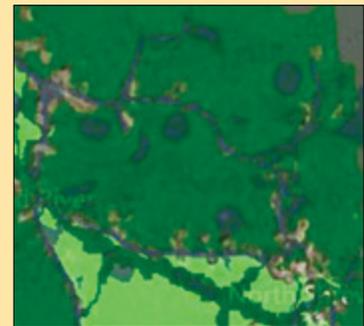
Using BioFinder in Step 2

1. After conducting Step 1, click in the box next to **Community & Species Scale (Components combined)**. Priorities at this scale will appear in blue and purple, on top of the landscape network from Step 1 in green.



2. Once again, click on a point of interest to learn more. When more than one layer is turned on and found in the selected area, the Identification Box creates a separate “page” of results for each layer. In this example, two layers are present, indicated by the **1 of 2** symbol in the top, right corner of the box. Click on the arrows to move between pages of results.

Now, examine where priorities at the two scales overlap. When community and species scale features fall within the **highest priority** landscape network (in dark green, such as in the image to the right,), conservation of the landscape network in this location is likely to conserve the important species and habitats within it, and additional conservation measures may be unnecessary.



Where community and species scale features fall within a **priority** (light green) landscape block (as in the image on the left), you may want to consider elevating the importance of the entire block to consider it a highest priority area.

Where community and species scale features fall outside the network mapped in Step 1 (pictured on the right), you may want to consider conservation measures that specifically target these resources when you get to Step 6.



Using Local Inventory Data in Step 2

If you have local inventory data, Step 2 is the place to include it. Regardless of the scope of your inventory, we recommend first identifying landscape-scale networks (Step 1), and then using local information to fill in gaps or to evaluate how well Step 1 includes important local features.

With the help of a natural resources professional, your inventory information can be combined with state-level community and species scale data to provide a clear picture of priority local resources.

Step 3: Identify the Components

In Steps 1 and 2, the primary goal was to identify locations of ecological priority within the municipal planning area. Before identifying appropriate conservation strategies, it's now time to determine which resources are present in each important area. We can then use these resources to create a map of ecological priorities that will be more helpful for municipal planning. This is important because conservation strategies are not universally appropriate for all resources. Both [riparian areas](#) and [mast stands](#) may constitute priority locations, but we wouldn't generally conserve them using the same methods.

To identify components, have [BioFinder](#) and/or Part I of this guide handy. If you are comfortable using online technology, using BioFinder for this step is recommended.

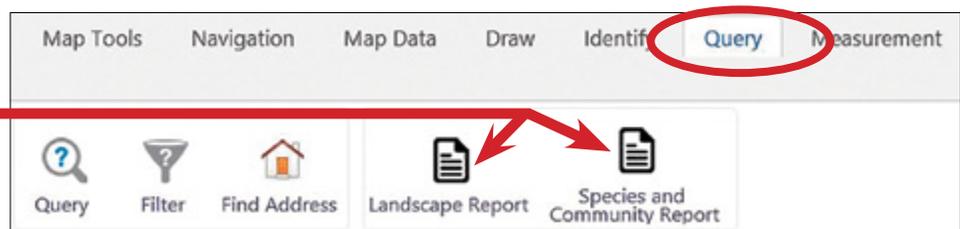
Start with landscape priorities, as seen in Step 1. Using BioFinder or by flipping back and forth between the maps in Part 1, which components are most prevalent in the "highest priority" network? [Interior forest blocks](#)? Surface water? Important [physical landscapes](#)? Does adding "priority" areas contribute additional components? Make a list or chart. Then repeat the process with community and species priorities.

To help you with this process, BioFinder can generate reports quantifying all the components present in a defined area, such as a town.

To access these reports, open the toolbox by clicking the tools symbol in the top, right-hand corner.



Open the **Query** tab, where you can select either a **Landscape Report** or a **Species and Communities Report**.



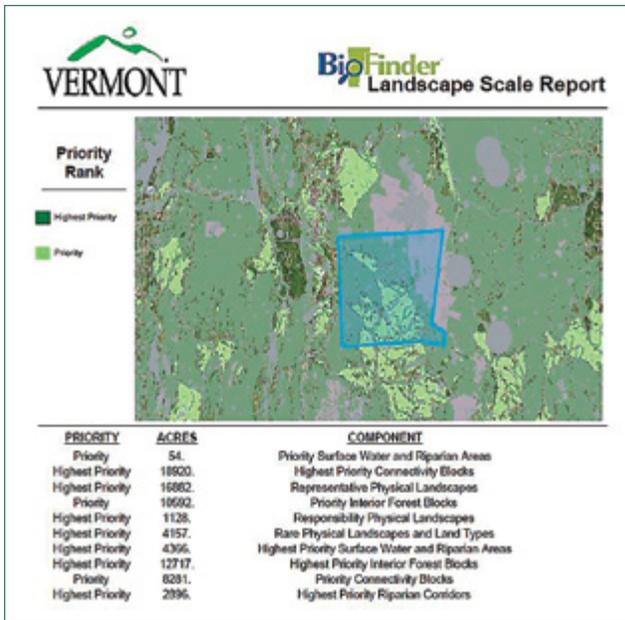
In generating a report you will be given an option to either draw an outline of your area of interest or upload a shapefile. If you already have a digitized map layer that outlines your area of interest (a shapefile), this is the easier option. However, you can also use your cursor to click around the edges of your target area until you have captured the entire area, double-clicking to finish the shape.

You can choose to see the report as a pdf or an excel file. In either case, the report lists all components present in the area outlined, the level of priority, and the acreage covered by each.

In some cases, the acreage covered by different components can give you a sense of where to focus your efforts. For example, if you have substantial acreage in connectivity blocks, you may want to spend some effort thinking of the best ways to avoid fragmentation of and between these blocks. However, there are some components for which acreage is an inappropriate measure of priority. For example, vernal pools are almost never large, and yet they remain an important contributor to biodiversity. Reports can therefore be extremely helpful in simply providing a list of components to look at when considering conservation strategies. Limited attention should be placed on the acreage covered by each, particularly on the Species & Communities Report.

You may find that dividing priority components into broad categories will make your list easier to use. For example, the landscape network in most Vermont towns can be divided into forests and waters. Outside these forests and waters, there may be a few isolated resources located in small patches of forest, agricultural fields, or residential areas. Dividing the landscape into categories may make it easier when identifying conservation strategies in Step 6; a town may use one set of strategies within forest areas, another in waterways, and a third to conserve isolated ecological features.

Once you have created your list of components, review them to be sure you understand what they are and their implications for land use, using Part I of this guide, *Conserving Vermont's Natural Heritage*, or other sources. Take extra care to understand those features



An example of a Landscape Report in a pdf format.

that came up multiple times on your lists or cover large expanses within your community.

Once you fully understand the suite of components at play in your community, it is time to create a map of ecological priorities. For many communities, these maps can be based directly on the state priorities maps, or by incorporating local data into state maps. For some communities, however, it will be important to first refine priorities. For example, the land in some communities is mapped almost entirely as “highest priority” at the landscape scale. In this case, it is important to recognize the crucial role your local lands and waters play in maintaining Vermont’s ecological function. However, this information is unlikely to help you in prioritizing local conservation or planning efforts. Other towns contain few or no highest priority features. In either case, there are some locations in your community that play a more critical ecological role than others.

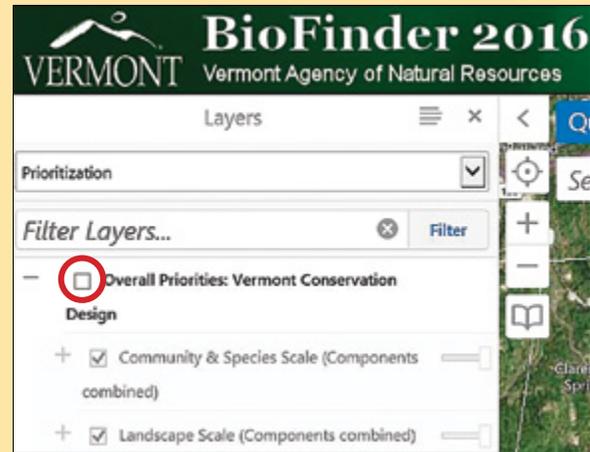
Rare and Uncommon Species Mapping

As you identify important components, you will find that many rare and uncommon species are mapped by a round circle. This circle is not an accurate representation of the land covered by the species; it is merely a dot surrounding the approximate location in which the species was found. When considering conservation strategies, identifying the habitat in which the species occurs will have more merit.

Using BioFinder in Step 3

To see components individually:

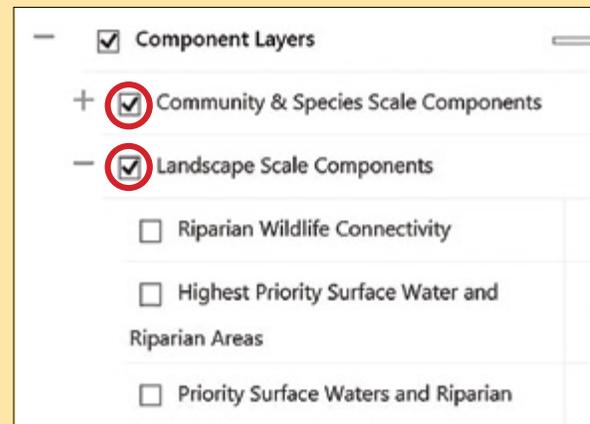
1. Un-check the box next to **Overall Priorities: Vermont Conservation Design** to turn it off.



2. Check the boxes next to **Community & Species Scale Components** and/or **Landscape Scale Components**, under **Component Layers**, to turn them on. Be sure the **Component Layers** box is also checked.



3. Click the + next to each category to display a list of individual components that can be turned on or off.



4. Explore!

In these cases, one way to further prioritize is to place a higher priority on locations with many overlapping components. You can think of these as hotspots—places in which many important ecological components co-occur. Wetlands are important. Interior forests are important. Rare physical features are important. Locations in which all of these important components are present may have even higher ecological value than those with just one component. If you find that the basic prioritization of Steps 1 and 2 did not provide you with as much variation as you would like, you can place the highest priority on these hotspots of overlap. They can also be terrific starting places around which to focus efforts or rally community support.

If you choose to re-prioritize, it is important to remember that this step focuses only on ecological prioritization. Human values will be incorporated in Steps 4 and 5. For some communities, it may be tempting to eliminate some areas from the priorities map based on a value judgment of what is most important. We encourage you to resist this temptation, ensuring that your determination of which features to include is based on a scientific process.

Priorities:

Lands and Waters with Many Functions

Many highest priority areas are important not only ecologically but also for forestry, recreation, scenery, rural enterprises, and many other human uses. When mapping landscape scale priorities, keep in mind that conservation of these areas can include diverse strategies, both [non-regulatory](#) and [regulatory](#), and can often support these human land uses in addition to ecological values.

We'll discuss these strategies in Step 6. Some towns may find it appropriate to include high percentages of their land area in these highest priority areas, but conserve them with a low regulatory standard or a non-regulatory strategy.

Before completing Step 3, you should have a map that outlines the ecological priorities within your community.

At this point, it is time to involve your community as you decide how to move forward.

Need Help?

The Community Wildlife Program at Vermont Fish & Wildlife Department may be available to provide technical assistance to your community as you undertake this process. For more information please visit:

vtfishandwildlife.com/get-involved/partner-in-conservation/community-wildlife-program



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Using BioFinder to Print a Map

1. Open the **Map Tools** tab, inside the **Toolbox**.
2. Select **Print**.



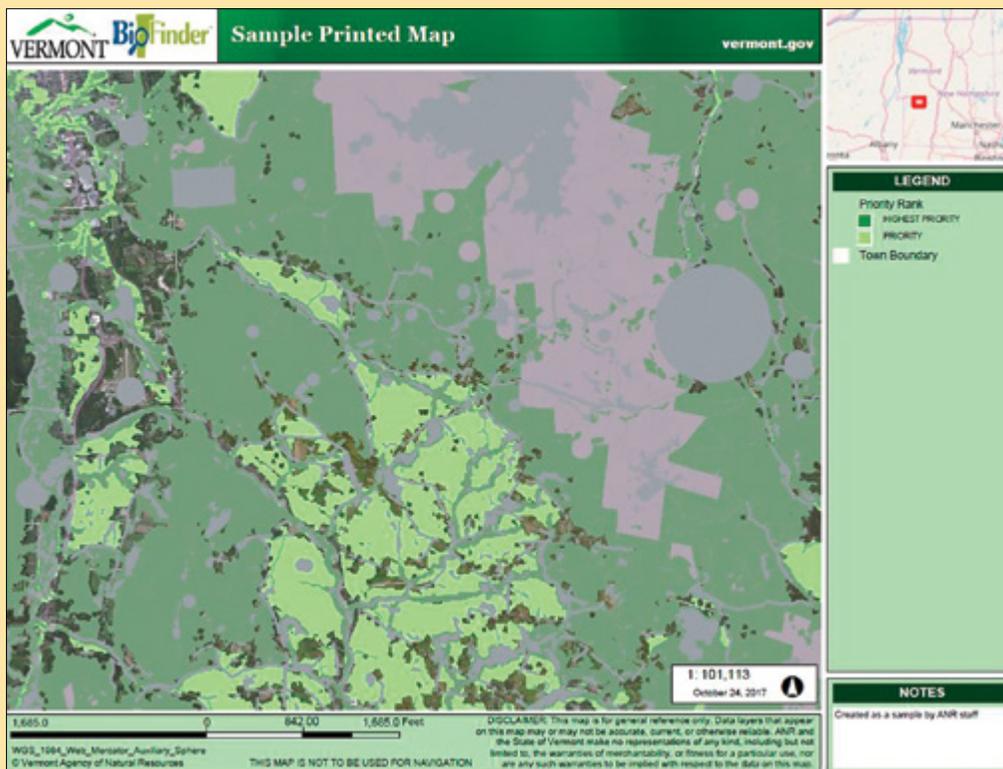
The 'Print Map' dialog box contains the following fields and options:

- Select Layout:** BioFinder Landscape
- Output Format:** pdf
- Resolution:** 96 - Standard Resolution
- Map Scale:** Current Scale - 1: 144448
- Title:** Sample Printed Map
- Notes:** Created as a sample by ANR staff
- Lock print preview with map
- Buttons:** Print (circled in red), Cancel



3. Fill out the form that appears in the left panel. Click **Print**.

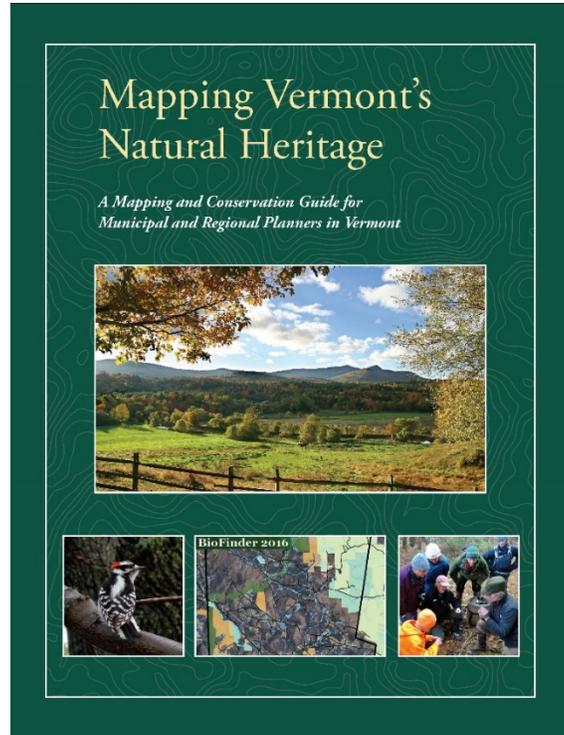
4. Your map will be generated, and a link will be provided.



Additional Mapping Options: BioFinder includes many additional tools that can help you select your own priorities and create your own maps. See links for tips and tutorials from the [BioFinder Home Page](#), or seek technical assistance from Vermont Fish & Wildlife Department's **Community Wildlife Program** to learn more.

Mapping Vermont's Natural Heritage

This is one chapter of a larger publication called *Mapping Vermont's Natural Heritage: A Mapping and Conservation Guide for Municipal and Regional Planners in Vermont*. Please visit <https://anr.vermont.gov/node/986> for additional information or to see the entire guide.



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