

Strategic Recommendation

If you are planning an adventure into beekeeping, a botanical audit should be part of the business plan. There are private consulting botanists/ecologists who will perform a formal botanical audit on a 3-mile radius surrounding the intended placement of any apiary. This can also be simply achieved yourself. Securing a long-term lease or purchasing land in a legally protected zone ensures your high-capital infrastructure investment is backed by a permanent, diverse, and toxin-free nectar source. Many times, the industry discounts botanical audits for open-apiary Langstroth hive business models. Most perform lighter, rapid visual audits across multiple random bee yards, utilizing mobility to exploit the planning stage of placing a yard once in a premium location. The placement of a TN Bee House and/or open apiary in a great location, like a conservation easement property, is all about profitability. The amount is easily evaluated by a simple study.

A Simple Botanical Audit Template

A botanical study can be extremely intense and/or remedial but thorough for the beekeeping game. In our adventures, we have chased a simple model that establishes a location as viable for bees to flourish. Most areas of TN have enough forest to support an apiary. First, research and choose your location. The matrix for that is based on the natural foraging habits of the honeybee. Keep these boundaries in mind as you continue.

Honeybees will routinely forage for pollen and nectar within a 2- to 3-mile radius of their hive, though they can fly up to 5 to 8 miles in times of extreme resource scarcity. The physical mechanics, spatial efficiency, and foraging boundaries of a colony depend on resource availability and distance. While bees are physically capable of long flights, they operate on a strict energy-budget system.

Most of a colony's daily foraging occurs within 0.5 to 1.5 miles of the apiary. If a premium nectar source, like a blooming field of clover or a collective of sourwood trees, is close by, bees will rarely fly farther than necessary to fill their honey stomachs. Interestingly, bees generally ignore flowers located within 100 feet of their own hive entrance, as their flight trajectories carry them up, out, and away from this immediate perimeter. When local resources dry up during a summer dearth, the foraging boundary expands dramatically. Scout bees will fly up to 8 miles away to locate food. Flying long distances requires the bee to consume a significant portion of its loaded nectar just to fuel the return flight. At 5+ miles, the caloric cost of the trip often outweighs the nutritional value of the payload brought back to the hive. Because a radius expands exponentially into an area, a bee colony commands an immense amount of territory.

A 1-mile radius gives the bees access to roughly 2,000 acres of forage.

A 2-mile radius expands their territory to over 8,000 acres.

A 3-mile radius opens more than 18,000 acres of potential food sources.

Bees prioritize their flight distances differently depending on what they are harvesting. Bees will travel much farther for nectar because it provides the immediate carbohydrates needed to fuel their flight muscles. Bees prefer to find pollen closer to home (usually within 1 mile). Pollen is heavy, creates significant aerodynamic drag when packed into the corbiculae (pollen baskets) on their hind legs, and does not provide an immediate fuel source for the flight back.

To establish a satellite map with an exact 3-mile radius circle around a specific location, the industry standard is to use Google My Maps (a free browser-based tool) combined with a radius-generation tool. Standard Google Maps does not have a built-in tool to draw perfect radius circles, so you must use this specific workaround.

Generate the Radius Data (KML File)

Because Google My Maps requires external geometric data to draw perfect circles, you must generate a coordinate file first.

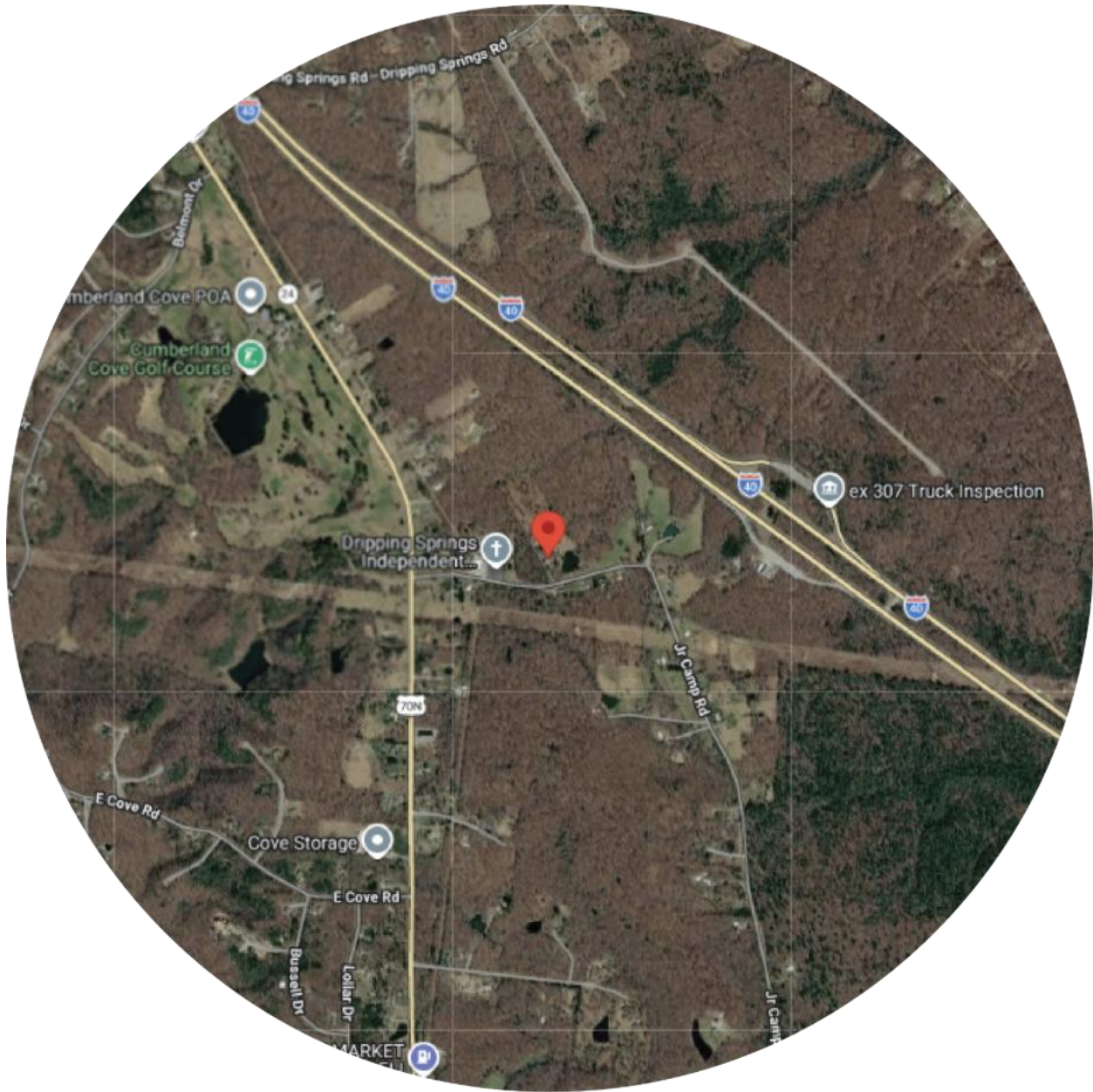
1. Go to a free online radius generator tool, such as KML Circle Generator or MapDevelopers.com.
2. Type in your target apiary or property address.
3. Set the radius distance to exactly 3 and choose **Miles** as the unit.
4. Click **Generate** or **Create**.
5. Download the file, ensuring it is saved in .KML or .KMZ format.

Create the Custom Google Map

1. Open your web browser, navigate to Google My Maps, and sign in with your Google account.
2. Click the **+ Create a New Map** button in the top-left corner.
3. Click on **Untitled map** to rename it (e.g., "Apiary 3-Mile Forage Range").

Import the Radius and Switch to Satellite View

1. In the left-hand menu panel, click the **Import** button under the first **Untitled layer**.
2. Drag and drop the .KML file you downloaded in Phase 1 into the upload box. The 3-mile circle will instantly appear on your map.
3. Look at the very bottom of the left-hand menu panel and click **Base map**.
4. Select the **Satellite** thumbnail from the grid. The map will instantly swap from the standard road view to high-resolution satellite imagery.



This is the 3-mile radius of the Makers Bee House located in Monterey, TN, on the Cumberland Plateau. This aerial shot was taken in the winter months, so other than evergreens, the trees are brown. The bee house is surrounded by dense forest. This circle represents just over 18,000 acres of Tennessee's natural trees and plants. Within our circle, there is one significant hot spot: the golf course. Any golf course is generally considered a significant concern and potential hazard to honeybee producers, though it depends heavily on how the course is managed. While they offer wide-open green spaces, traditional golf courses present two major threats to honeybees: chemical exposure and lack of food. In recent years, the golf industry has pushed toward environmental stewardship, transforming some courses into surprising assets for local beekeepers. Perfectly manicured turf grass

offers zero nectar or pollen for a honeybee. Regular mowing schedules also clip away low-lying weeds like dandelions and clover before they can bloom. From a bee's perspective, a standard golf course is a massive, sterile food desert. The Cumberland Cove Golf Course property is 124.30 acres, claims to practice all-natural stewardship, and is buffered by almost a mile of dense forest and vegetation.

An 18,095.57-acre forest in Tennessee does not automatically produce honey on its own. Instead, honey production depends on the number of beehives placed on the land, yielding anywhere from 37,700 to 150,800 gallons of honey per year if the area is fully populated with managed bee colonies.

The Three Factors That Determine Yield

To calculate how much honey this specific circle of forest can produce, beekeepers look at three primary metrics. A healthy forest typically supports 0.5 to 2 hives per acre without over-saturating the local ecosystem. An established, healthy hive in Tennessee yields an average surplus of 30 to 60 pounds of honey per year. One gallon of liquid honey weighs exactly 12 pounds.

Step-by-Step Calculation (Mid-Range Scenario)

If you assume a standard density of 1 hive per acre and an average harvest of 50 pounds per hive, the math works out as follows:

$18,095.57 \text{ acres} \times 1 \text{ hive/acre} = 18,095.57 \text{ hives}$

$18,095.57 \text{ hives} \times 50 \text{ lbs.} = 904,778.5 \text{ pounds of honey}$

$904,778.5 \text{ lbs.} \div 12 \text{ lbs./gallon} = 75,398.2 \text{ gallons}$

Note: As stated in other sections of this report, according to the USDA National Agricultural Statistics Service (NASS), Tennessee's beekeeping landscape is characterized by a massive volume of highly decentralized, small-scale hobbyist operations. Because the USDA handles commercial tracking differently from its five-year comprehensive census, the demographics and production statistics for Tennessee reflect a distinct dual structure. The total hive population in TN sits at 18,663 managed colonies. Total state production, when factoring in all 18,663 hives from the broader Ag Census (including backyard hobbyists), is over 524,000 pounds of honey annually. The 3-mile radius evaluation of the Makers IP Bee House is capable of producing 904,778.5 pounds of honey at a saturation of 1 hive per acre. The total year-round sustainable saturation for a managed forest above 1,500 feet in Tennessee is 0.1 to 0.2 hives per acre (or 1 hive per 5 to 10 acres), though short-term seasonal saturation can peak at 1 to 2 hives per acre during the summer bloom. Based on the 18,095.57-acre circle, this means a permanent saturation of 1,810 to 3,619 total hives.

