



Electric Fences

Solar-charged or 110 volt electric fencing is one of the most effective methods to reduce black bear damage. An electric fence must be well grounded, sufficiently charged at all times, and maintained on a regular basis.

Maintenance:

- Clipping or applying herbicide to vegetation growing under the fence and ground mat
- Recharging the battery
- Checking wire voltage with a voltmeter.

If proper maintenance or constant electrification is not possible, remove the fence immediately. Once a bear penetrates a fence, it will likely challenge fences in the future.

Key features of fence design:

- Strand spacing:
 - Permanent Fencing – Wire strands should be no more than 8 inches apart
 - Temporary Fencing – Wire strands should be no more than 12 inches apart
 - For both types – Bottom wire should be no more than 8 inches above ground
 - For both types – Top wire does not need to be more than 3½ feet high
- Energizer type
 - A New Zealand style energizer provides a stronger shock (at least 4,000 to 5,000 volts is needed) than a strip grazing energizer. It also decreases maintenance by reducing the need to clip vegetation growing under the fence.
 - Ground the energizer by connecting it with a wire and a ground connector clamp to a half-inch by 6-foot rod driven into the ground.
- Grounding effectiveness
 - A chicken wire mat 3 feet wide can be placed around the perimeter of the fence to ensure that the bear is grounded when it touches the fence.
 - Connect the chicken wire to the grounding rod and pin it to the ground to prevent wind from blowing it into the fence.
 - The chicken wire mat is difficult to pick up if beehives are moved frequently or if a lot of vegetation grows through it. Under these conditions, as well as when livestock are present, the mat can be omitted.

Protection:

- To protect the energizer and battery from theft and from damage by animals, place them inside the fence.
- To provide additional protection against theft, place energizer and battery in a hive body modified to exclude bees.
- Place active hive bodies above the one containing the electronic equipment.
- Although bears seldom break through a properly constructed and maintained fence, some failures have occurred when hives were placed close to the fence. Therefore, locate beehives at least 3 feet from the fence.

TIPS FOR BEAR FENCES

1. Install the fence before a bear starts to feed on your bees.
2. Use at least 5' of ground rod in the ground - the deeper you ground the fence, the better it will work during dry spells.
3. To avoid grounding out your battery, keep the grass mowed around the fence.
4. Do not use an energizer with a capacity that is greater than what is needed - you are running bees, not cattle - a 10 mile energizer is fine.
5. Check your fence each time you visit your apiary - adjust the distances between the wires if needed - keep an eye out for short circuits.
6. Measure the fence voltage each time you visit the apiary.
7. Purchase two batteries for each fence - keep the second one charged and switch it with the run-down battery when you visit your apiary, that way you can avoid an extra trip and potentially dangerous 'down time' when the fence is not protecting your bees because you are recharging your battery.
8. For protection in dry areas, fix chicken wire or hardware cloth to the ground along the outside of the fence perimeter and connect it to the ground post.
9. Do not leave garbage in the vicinity of your apiaries.
10. Do not locate your apiary beneath overhanging branches that may fall on your fence.



Temporary electric fences: There are two common types of temporary fences; the woven-wire electric fence and the high-tensile electric wire. Both are described below.

Other temporary fences can be constructed with electroplastic netting, electrified twine or hot tape attached to posts or trees. Costs range from \$200 for fences using hot tape to \$750 for electroplastic netting. Effectiveness often reflects price.

Temporary woven-wire electric fence (Figures 1 and 2): A temporary woven-wire 30 x 42 foot electric fence can hold 32 colonies and costs approximately \$300 (Figure 1). A woven-wire electric fence is built with nine steel T-posts driven vertically into the ground (Figure 2). If the soil is sandy or soft and wet, substitute wooden posts in the corners.

Put one ½ in. PVC pipe over the steel posts as an insulator. Secure 32-inch high woven wire 6 to 8 inches above the ground outside the enclosure. Use a loop of baling wire at the top and bottom of the wire to attach it to the PVC pipe.

Materials for a Temporary Woven-Wire Electric Fence

- 1 Solar charger and a 5.5 watt solar panel
- 1 Interstate PC1270 jell cell battery
- 15 ft. Insulated cable
- 3 Insulated gate handles
- 9 1½ inch x 4 foot PVC pipes
- 150 ft. 32 inch wide light (about 18 gauge) woven wire with square mesh and wire spacing ranging from 2 inches on the bottom to 5 inches on top.
- 9 6½ ft. steel "T" posts
- 150 ft. 36 inch wide chicken wire
- 40 Metal tent stakes or home-made no. 9 wire pins
- 1 6 ft. by 1/2 inch ground rod and clamp

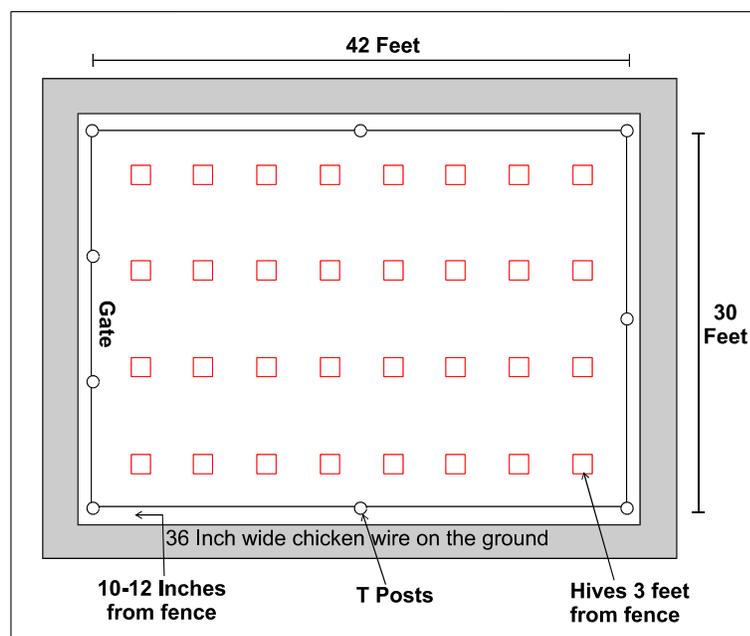


Figure 1. Top view of a temporary woven-wire electric fence and a temporary high-tensile electric fence designed to protect beehives from bears, showing spacing of posts and the position of beehives and chicken wire grounding apron relative to the woven-wire electric fence. Another "T" post is added to each of the longer sides of the temporary high-tensile electric fence.

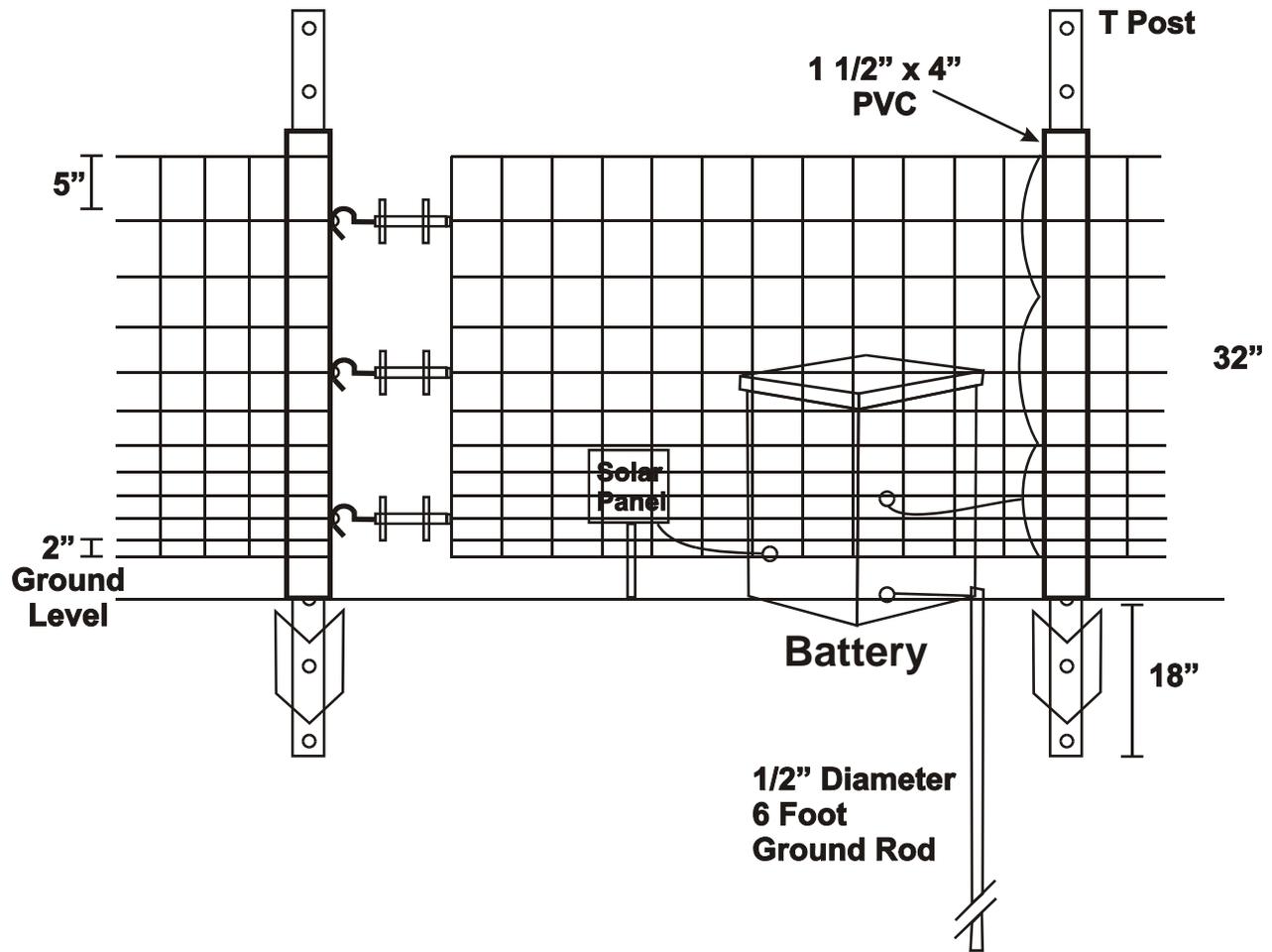


Figure 2. Side-view of a woven-wire electric fence is built with nine steel T-posts driven vertically into the ground.

Temporary High Tensile wire electric fence (Figures 1 and 3): Four strands of high tensile wire, spaced at 6, 16, 28 and 40 inches above the ground, can be used instead of woven wire (Figure 3). Place an energizer cut-off switch on one of the posts to allow easier access to the hives. However, it may encourage tampering with the hives.

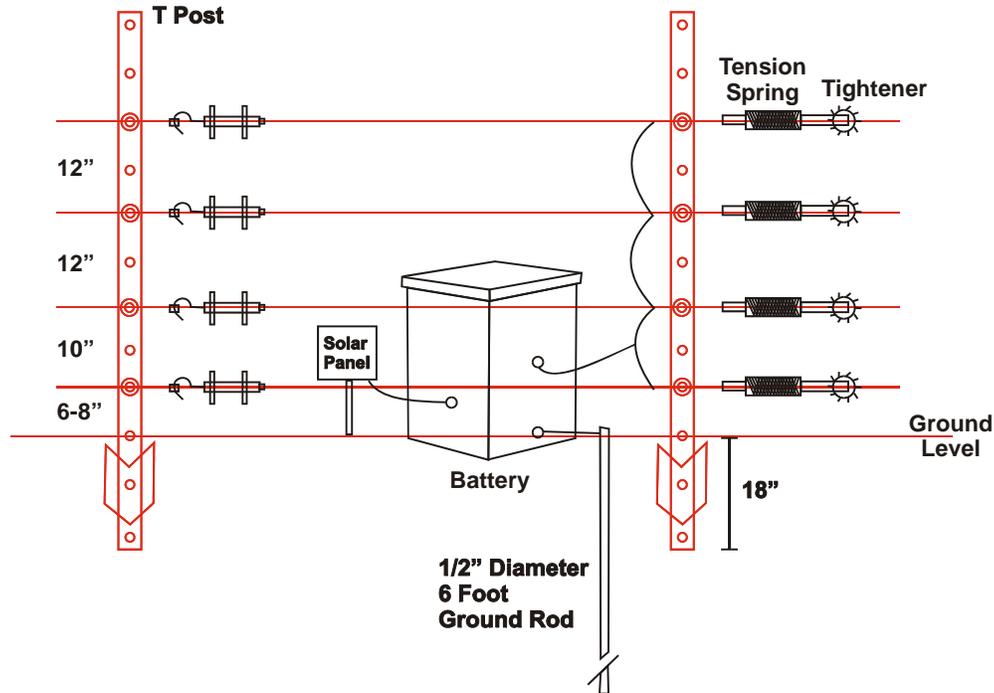


Figure 3. Side view of high tensile wire electric fence.

Materials for a Temporary High-Tensile Electric Wire Fence

- 1 Solar charger and a 5.5 watt solar panel
- 1 Interstate PC1270 jell cell battery
- 15 ft. Insulated cable
- 4 Insulated gate handles
- 4 Heavy duty tension springs
- 4 In-line strainers (wire tighteners)
- 600 ft. 17 gauge high-tensile wire
- 11 6½ ft. steel "T" posts
- 48 "T" post insulators
- 150 ft. 36-inch wide chicken wire
- 40 Metal tent stakes or home-made no. 9 wire pins
- 1 6 ft. by ½ inch ground rod and clamp

Charger with Solar Panel



Permanent and semi-permanent electric fences: These can be made from multiple strands of electric wire or woven wire attached to wood, steel or fiberglass posts. An electric or solar charger, an energizer and a battery are required to charge the fence. One example of an effective permanent electric fence measures 50 feet x 50 feet (often smaller) and costs approximately \$1,200 (Figures 4 and 5).

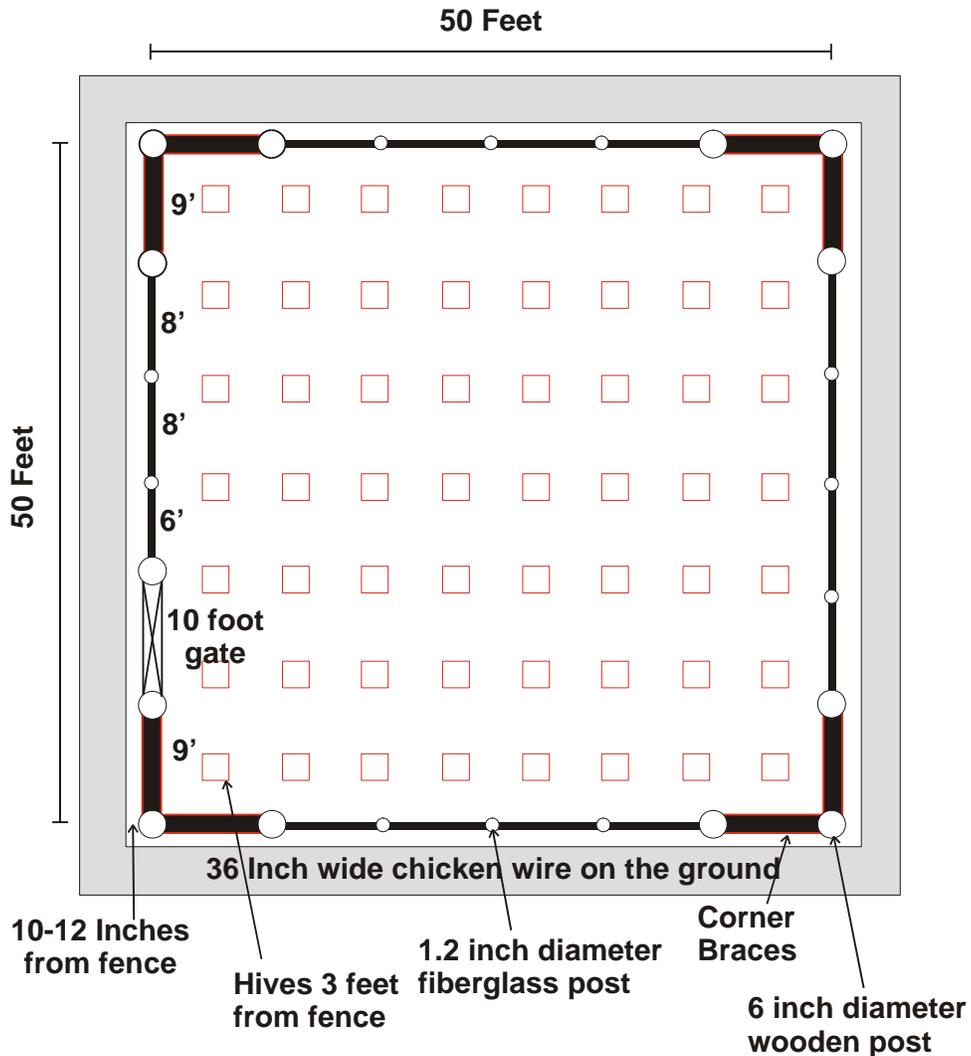


Figure 4. Top view of a permanent high-tensile electric wire fence designed to protect beehives from bears, showing spacing of posts and the position of beehives and chicken wire grounding apron relative to the fence.

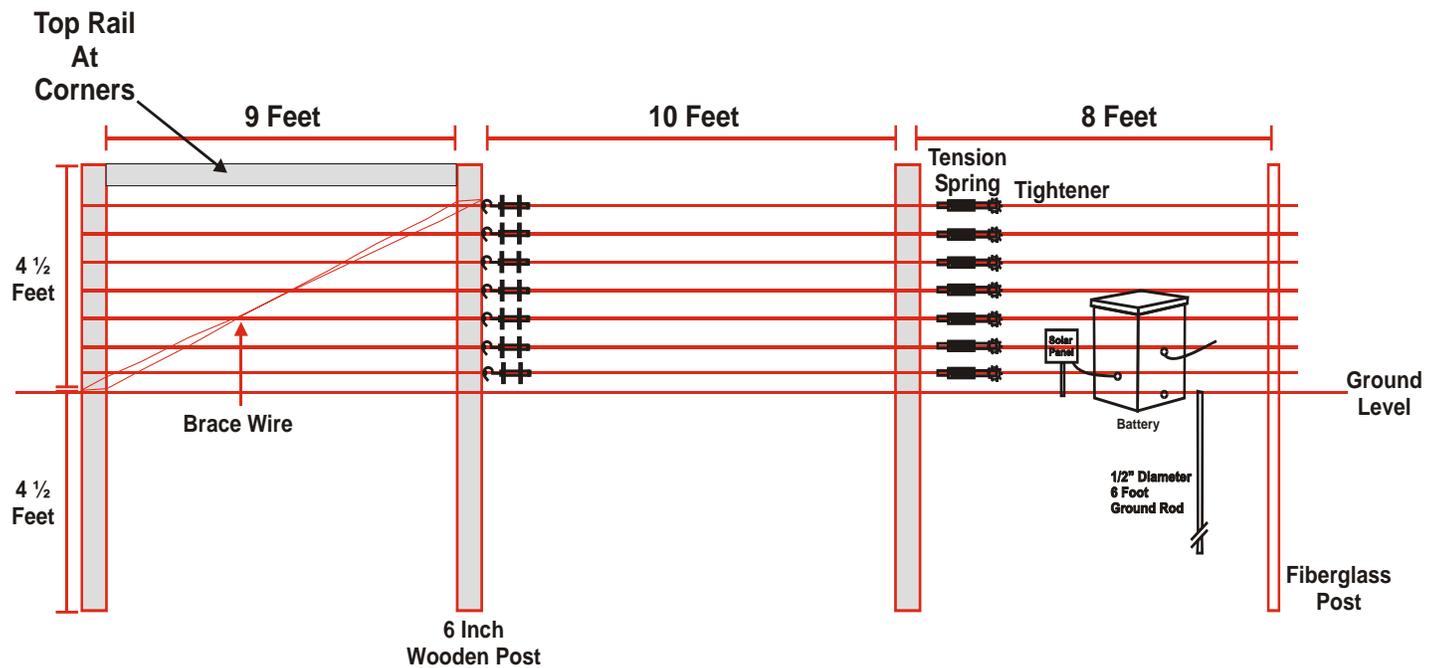
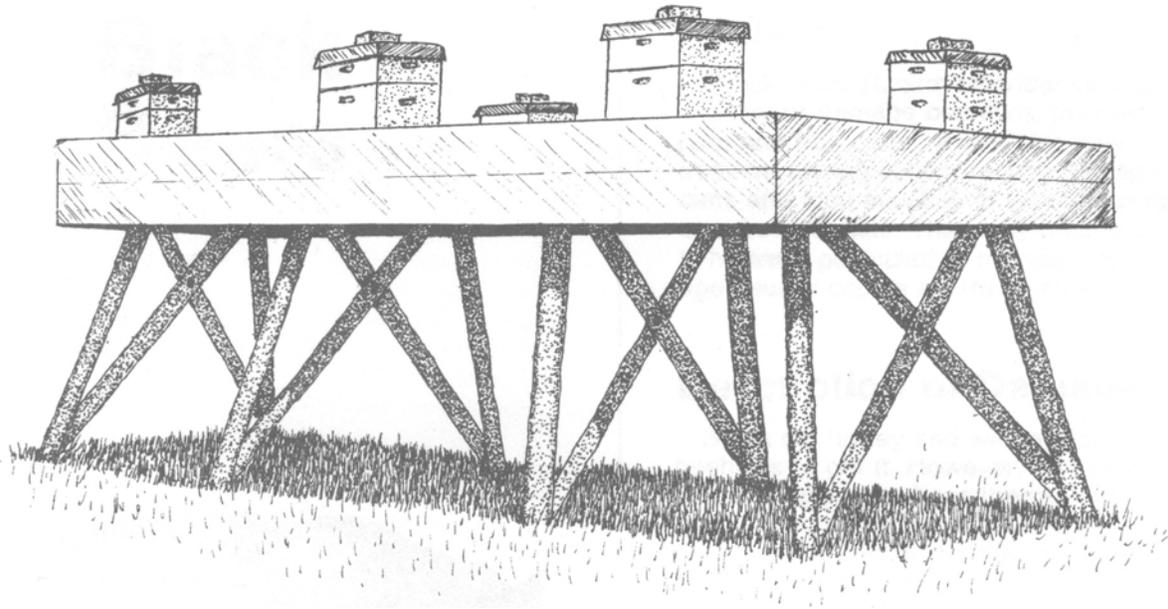


Figure 5. Side view of a permanent high-tensile electric wire fence.

Materials for Permanent Electric Fence

- 1 New Zealand style 12 volt energizer
- 1 85 amp-hour deep-cycle battery
- 1 20-watt solar panel
- 1 Lightning arrestor
- 13 9 foot x 6 inch wood corner posts (CCA treated)
- 8 9 foot x 4 inch wood top rails (CCA treated)
- 11 7 foot x 1.2 inch fiberglass line posts
- 1 1,500 foot coil 12 1/2 gauge high-tensile wire
- 70 ft 1 x 19 galvanized aircraft cable
- 100 ft 12 1/2 gauge insulated wire
- 100 ft Insulated tubing
- 7 Heavy-duty gate handles
- 7 In-line strainers (ratchet-type)
- 7 In-line tension springs
- 1 bag 12 1/2 gauge compression sleeves
- 1 box 3-4 Nicotap sleeves
- 20 10 inch x 3/8 inch H-brace pins
- 5 lbs. 2 inch zinc barbed staples
- 240 ft. 36-inch wide chicken wire
- 40 Metal tent stakes or home-made no. 9 wire pins
- 1 6 foot x 1/2 inch ground rod and clamp



Beehive Platform

Elevated platforms are effective at eliminating bear damage to beehives, but generally are impractical because they are expensive, relatively immobile, and present difficulties when working with the colonies. Platforms can be wood or steel and should raise the colonies at least 8 feet above the ground. Black bears are excellent climbers, so install a 2-foot overhang around the edges of the platform.

PREPARED BY

Mike Carraway, Technical Guidance Biologist
NC Wildlife Resources Commission

Some of the recommendations and illustrations included in this document were gathered from various web sites and collated into a format specific to conditions and situations in North Carolina.

Portions of this document were taken from the North Carolina Animal Damage Control Manual section on Black Bears (No. 9) published by The North Carolina Agricultural Extension Service and updated with current information.

The original publication was prepared by:

Gary J. San Julian, Extension Wildlife Specialist
North Carolina Agricultural Extension Service

Howard A. Phillips, Technical Assistant
North Carolina Agricultural Extension Service

Robert B. Hazel, Extension Forest Resources Specialist (Wildlife)
North Carolina Agricultural Extension Service

Donald T. Harke, State Supervisor
United States Fish and Wildlife Service

Illustrations by Clyde E. Sorenson

Use of trade names does not imply endorsement by the North Carolina Wildlife Resources Commission, North Carolina Agricultural Extension Service or the North Carolina Agricultural Research Service of the products named or criticism of similar products not mentioned.

Electric Fences Suppliers

Electric fence supplies can be found at many local hardware and farm supply stores. Home Improvement Centers like Lowe's and Home Depot may also carry electric fence chargers, fencing, and supplies.

Additional sources for purchasing electric fence supplies can be found at the following locations:

Asheville Area			
Western Carolina Service	464 Riverside Dr Asheville, NC 28801	828-253-9351	
Hendersonville Area			
Western Carolina Service	5850 Asheville Highway Naples, NC 828-687-7725	828-687-7725	
Fletcher Lawn & Garden	Hwy 25 Fletcher	828-684-0561	
Sylva Area			
Bryson Farm Supply	1552 East Main St Sylva, NC 28779		
Waynesville Area			
Sorrel's Merchandising	3796 Jonathan Creek Rd Waynesville, NC 28786	828-926-0385	
National			
Premier Fence Systems	2031 300 th St Washington, IA 52353	1-800-282-6631	http://www.premier1supplies.com
MARGO Supplies LTD.	P.O. Box 5400 High River Alberta, Canada	403-652-1932	http://www.wldlf-cntrl.com