Nzi Trap Plywood Web Instructions PDF

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1 AUTHOR:

Steve Mihok

Canadian Nuclear Safety Commission

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Making a Plywood / Plexiglass Nzi Trap

Instructions are provided here for making a portable, collapsible painted plywood Nzi trap using typical lumber and hardware in North America. Similar traps can be made in other areas by adjusting sizes, and substituting other materials.

Instructions are also provided for making a robust, fixed trap with an inner frame.

Mihok, S. & Carlson, D.A. (2007) Performance of painted plywood and cloth Nzi traps relative to Manitoba and greenhead traps for tabanids and stable flies. *Journal of Economic Entomology*, **100(1), (in press)**.

This information is also provided in alternative formats below.

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- **Use exterior grade 3/8 inch plywood**; fill in any flaws with Polyfilla. This grade should not warp with time. It is a good compromise between cost, weight and durability. A thicker grade (1/2 inch) is also suitable, but a bit heavy. I do not recommend masonite (rots/warps) or 1/4 inch plywood (warps).

- **Catches of many biting flies are reduced by shiny features of traps, so use FLAT paint.** Only exterior latex paint has been tested so far; however oil-based paints should also be suitable. Apply a primer coat, and apply two further coats of paint.

- **The correct blue is critical.** An appropriate tint in the "Color Preview Collection" of Benjamin Moore paints is Brilliant Blue (#2065-30). Other brand names can be matched to this specific tint in paint stores, or on the web at **EASYRGB**. It is best to use a similar quality of black paint to avoid the need to repaint S/SW-facing surfaces. Cheap brands will fade badly after one season.

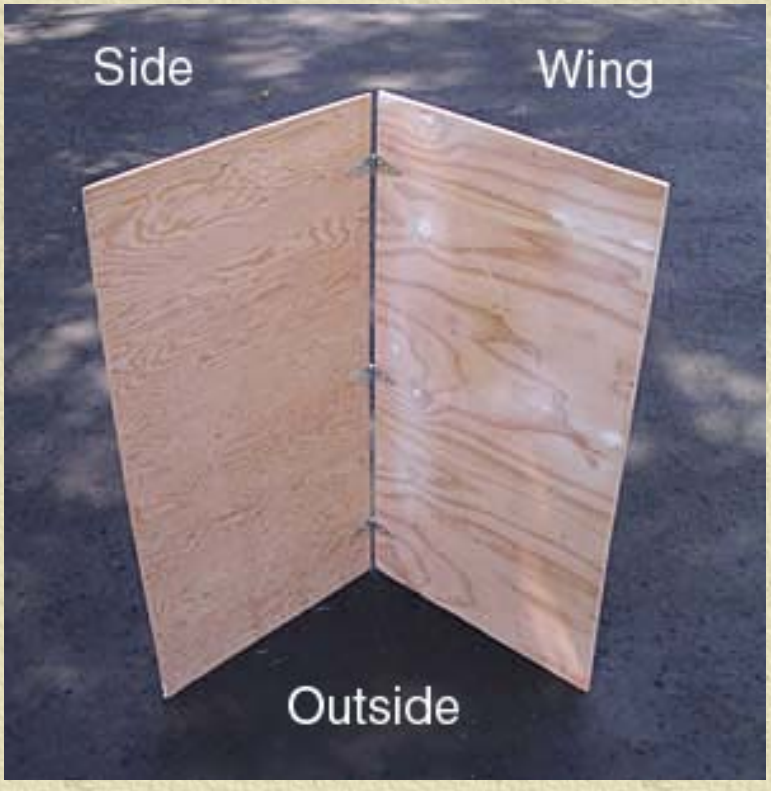
- **Recommendations for optimal cloth traps also apply to this format.** Hence, use white, highly transparent, ultraviolet-resistant, mosquito netting with only a minimal sheen; avoid using dark or very shiny netting. Experiments are still ongoing on the suitability of many other transparent materials.

- **Aluminum wire insect screening may be preferable** to netting for some applications, but I cannot provide advice on an appropriate material. The only product I have tested so far (thin, black wire mesh for windows) reduced catches of tabanids by a factor of two.

Materials will cost ~ US$ 50-70, depending on the hardware and paint used.

Construction Steps

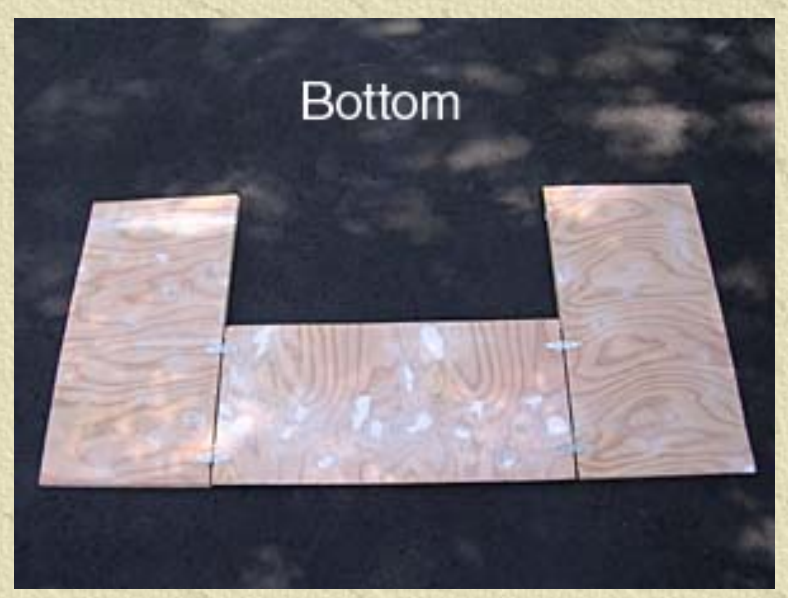
Start by cutting out five 36 x 18 inch pieces from a 4 x 8 ft sheet of plywood.
These standard trap dimensions will leave some waste. I have not experimented with alternative sizes. It should be possible to adjust the size of the trap in minor ways.



Join a side to a wing on what will eventually be the outside surface of the trap with three 2 inch light strapping hinges folding out. Do not put the outer hinges at the exact edges; do not put the middle hinge in the exact centre (this is where the inner shelf will be).

Use #6-32 flat socket bolts and hex nuts as fasteners throughout (screws will not hold well enough in this thickness of plywood). Leave a small gap so that the wing can be positioned, and so that the trap can be folded flat for storage in winter.

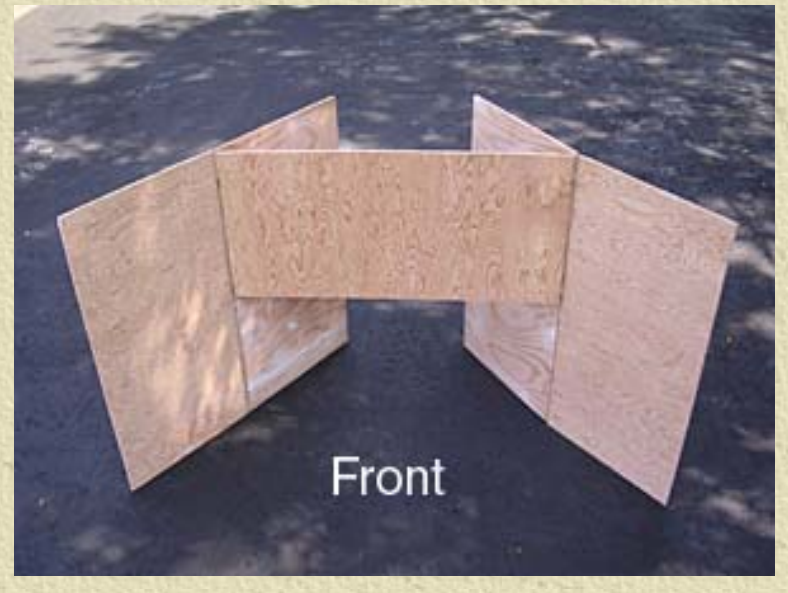
Repeat for the opposite side of the trap.



Attach the top front horizontal shelf to the sides using two strapping hinges on each short side, leaving a small gap as before.

The gaps need only be big enough so that the body can be positioned into a triangular shape as in the next slide. Gaps will permit flat storage as shown here.

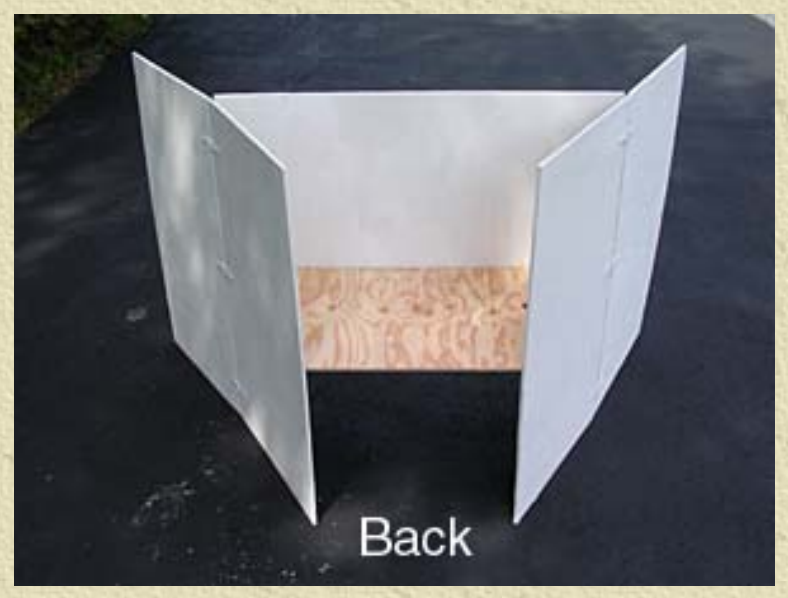
Note that the hinges will end up on the inside face of the trap.



This is the rough layout of the trap as seen from the front. The pieces should be able to move freely so that the completed back of the trap can form an equilateral triangle.

The wings are normally set angled outwards slightly, but this is arbitrary.

I have yet to do experiments on the effect of positioning the wings at different angles.



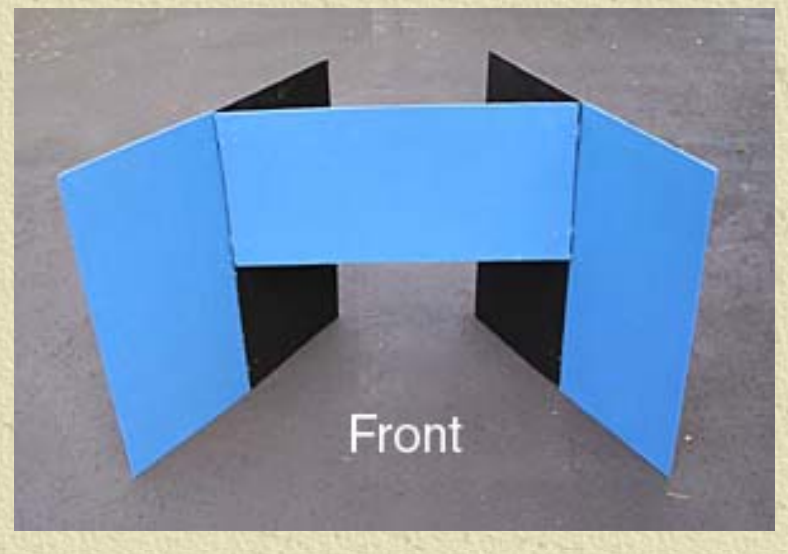
Apply a coat of primer. Paint over the hinges during all painting.

Fold the two sides of the trap inwards so that imaginary lines would intersect 36 inches from the front at the imaginary back corner of the trap.

Measure the gap where the inner horizontal shelf will be. Cut out a trapezoidal shelf of plywood to fit into this space.

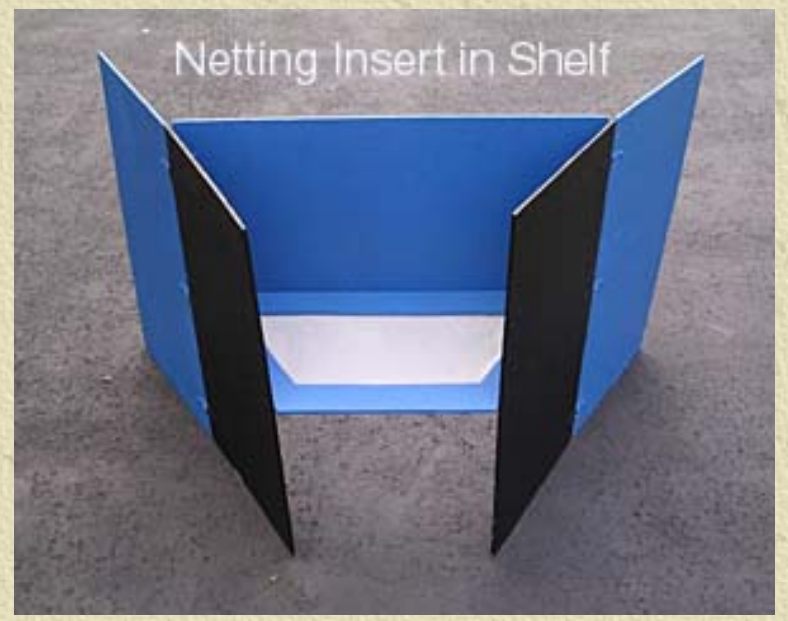
The trapezoidal shelf should be cut to fit and will be about 36+ in on the long side, 17-18 in on the other side, and 16 in deep.

Cut out the centre leaving an edge of 3-4 in. I fill the hole with netting, as in a cloth trap. A solid or a transparent shelf (plexiglass) may also work just as well.



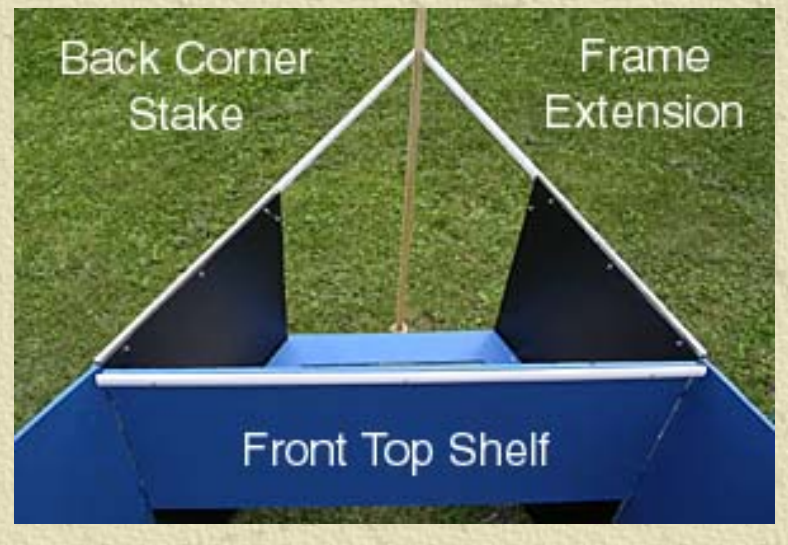
Paint the two wings and the top horizontal shelf blue. Paint the two sides black. Apply two coats of paint.

I paint the inner horizontal shelf blue, but this is arbitrary. I have yet to fully test the effect of changing the inner shelf. The nature of this shelf may not be critical as it seems to simply stop flies from escaping downwards once inside the trap body.



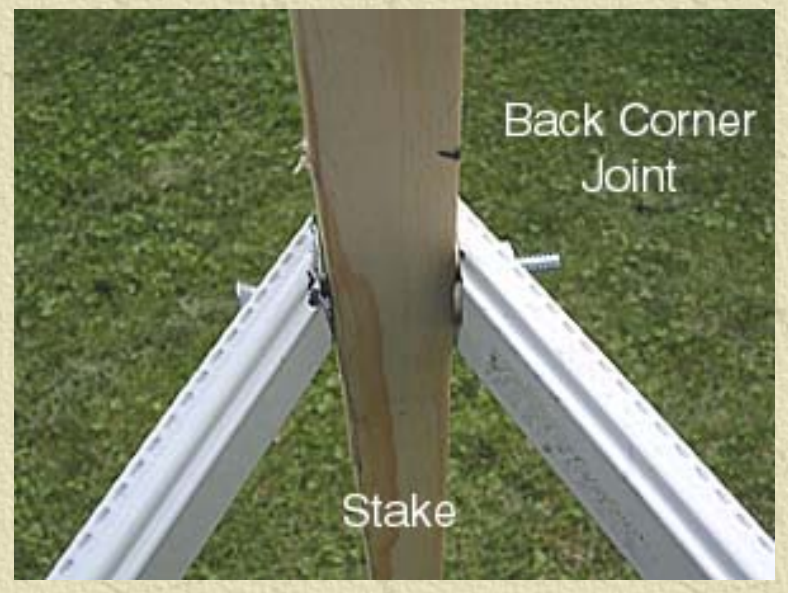
Attach the inner shelf to the top front blue shelf on the inside with two 3/4 in right angle braces. Use nuts and bolts so that the inner shelf can be removed easily for winter storage. Attach the shelf to the sides with one brace each, just inset from the back.

The use of a fixed, rigid shelf makes the trap stable in high winds and makes it easier to pick up and carry. Note that the wings still move freely on the front hinges.



Attach three ~ 36+ in pieces of light-weight aluminum window screen framing to the outside top edges with three bolts each. These will be used to hold the netting cone. Cut the side pieces to fit so that they meet at the exact back corner (see next close-up).

Use a 3/4 x 3/4 in hardwood gardening stake for the back corner. A 4 ft length is all that is needed.



For the back corner, cut the aluminum framing at an angle to fit flush against the gardening stake. Drill holes in the framing for a long bolt or pin to close the corner.

Drill a few holes over several inches at about 3.5 ft through the gardening stake to hold the bolt. The stake only needs to be lightly pounded into the ground when the trap is set.

Extend the framing at the front corners to the edge or beyond, ensuring that the wing can still move on the hinges. Keep the gap small so that netting will close up flush against the wood when the cone is attached.

Flies will crawl along edges and corners to try to escape , so it is important that corners in the netting are completely closed off.

At the back edge of the sides, bolt on a 35 in piece of framing, snug with the top framing. This will hold a second piece of netting that will form the back of the trap.

The side netting is not under tension and hence plastic moulding with a groove to hold a window spline can be used instead of aluminum window framing. See the next slide for examples of these products.

Side views of aluminum window framing on the right, and plastic moulding on the left. To save on cost, any product with the right size of groove to hold netting plus a spline should be appropriate for the sides.

The trap is best completed where it will be set in the field. Consult the instructions for cloth traps on Setting a Trap and Collectors for the North for various options.

I raise the body of plywood traps on four bricks or pieces of scrap wood to make it easier to trim grass throughout the season. Raising it off the ground will also keep the bottom edge of the plywood dry so that it does not rot in contact with the ground.

The front wings must be fixed in place with small stakes as they are hinged and free to move in the wind. With 3/8 inch plywood, the weight of the trap is also not quite heavy enough for the body of the trap to maintain its shape in very strong winds. Hence, the edges of the plywood should be pinned or fixed in place in several spots. I move traps for experiments, so I simply pin everything in place temporarily. For a maintenance-free trap, it is best to bolt the wooden panels to small stakes driven into the ground.

I use a T-bar + flexible plumbing pipe system at the back to suspend the cone. A long, and more substantial piece of wood for the back corner can also serve a dual purpose as both a back brace and as a post for another light piece of wood to suspend the cone.

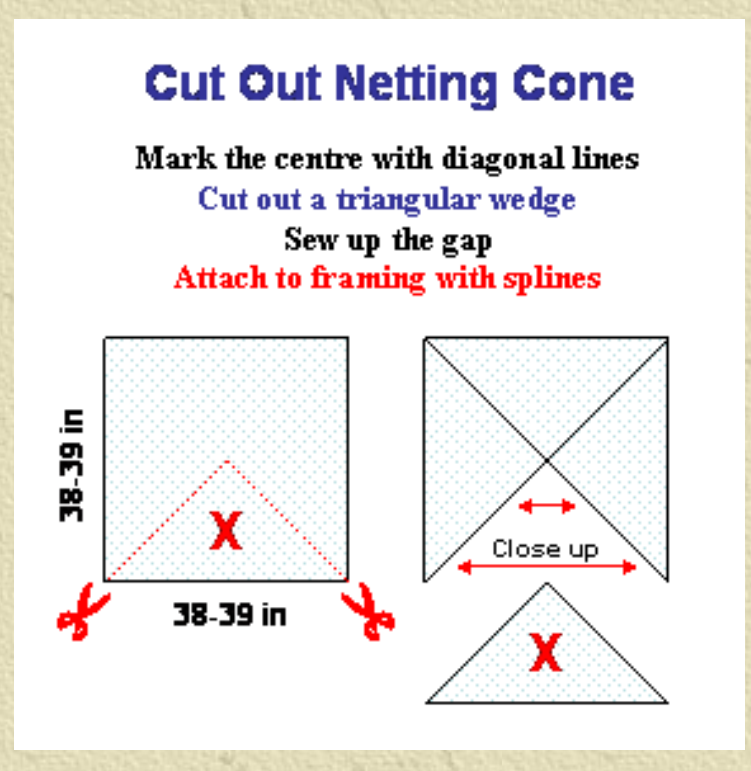
A completed trap set on four bricks

The wing is wired to a small stake at the edge to hold it in place. An iron T-bar + flexible plumbing pipe is used to suspend the cone + bottle / sleeve collector.

To complete the trap, first position the plywood on the bricks, then pound the gardening stake lightly into the ground.

Align the back framing with a hole in the stake and close the top corner with a bolt. Pound the T-bar in just behind the trap.

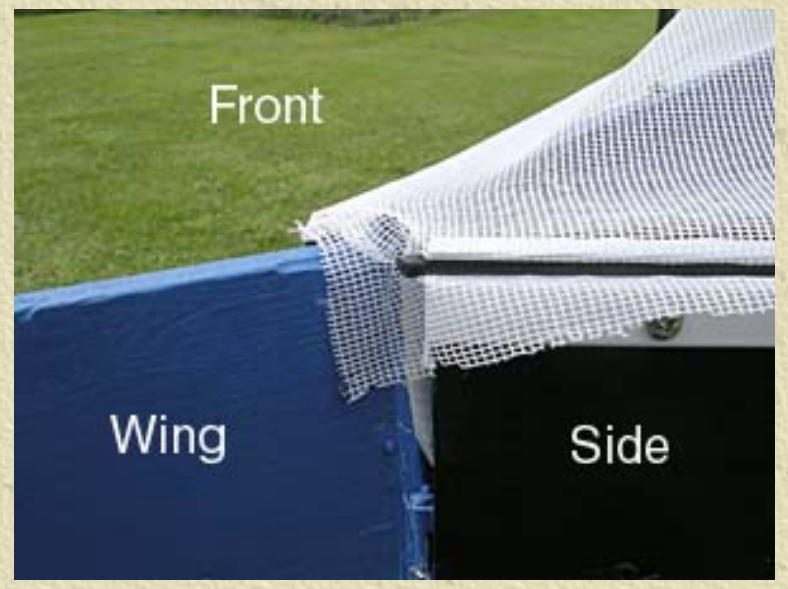
Fill all the gaps on the inside between the plywood pieces. Use outdoor tape and other hardware "filling" materials (foam, weather stripping) to close the gaps.



Prepare the netting cone. Note that the piece of netting to cut out is slightly larger than for a cloth trap, e.g. 38-39 in, depending on the size of the gaps in the finished trap.

Sew up the triangular gap leaving a hole at the top for the exit funnel to be inserted.

When attaching the cone and then the back netting, use the suspension pole to keep the bulk of the cone out of the way as it is being positioned and attached.



Centre the base of the cone at the front and attach to the front framing with a piece of spline long enough to wrap around both the front and one side. Use 6 in more spline than needed so you can tie a knot at the back. Tuck the netting into the gap at the corner and continue to run the spline halfway down one side. Repeat with a new piece of spline halfway down the other side, again using a piece 6 in longer than needed.

Cut out a piece of netting to form the back sides of the trap, e.g. 38 in high by 42 in long. It is easier to work with a larger piece than required, and then trim off any excess.

Overlap one top corner of the back netting with the still-open middle edge of the cone and fix some of the netting in place. Wrap the hanging piece around the back corner, stretch it to hang level, and fix the opposite edge as before to the netting of the cone.

Finish attaching the overlapping pieces for the back and the cone along the top all the way to the back corner to close up the cone.

Working down one side, attach the hanging netting with a piece of spline. Repeat on the other side, stretching lightly if necessary.

If the pieces of framing, wood and netting are aligned, the cone should close up at the back corner from the tension provided by the last few inches of spline.

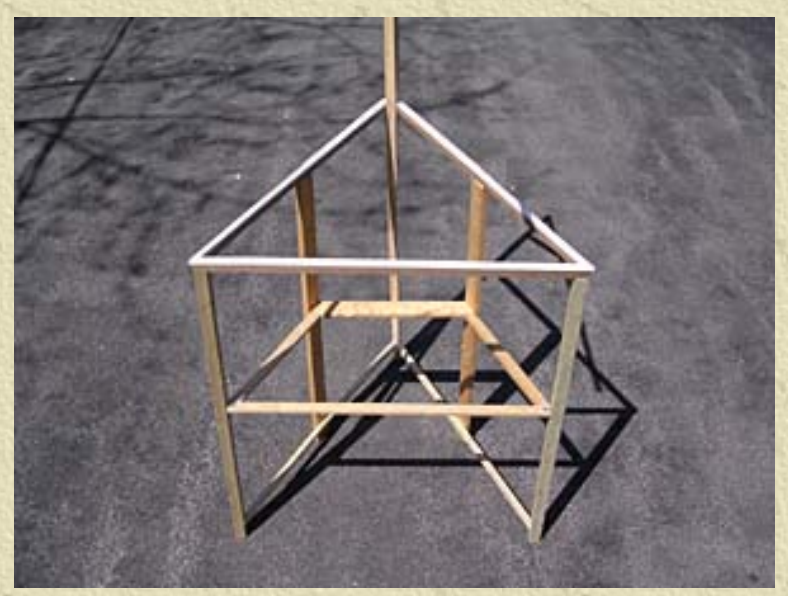
If not properly closed, wind transparent outdoor duct tape around the corner. The extra 6 in of spline can also be tied and wrapped around this area to close up if the fit or symmetry is not perfect.

There are many transparent materials that may be suitable as alternatives for netting. This is a subject of ongoing research.

For example, the plywood trap at left has a PVC cone. The back is a rigid sheet of acrylic bolted to the sides with piano hinges, and closed up behind with transparent tape.

Note that a completely enclosed cone and back is not stable in strong winds. Some netting is required to provide air flow and to minimize heat buildup inside the trap.

A Robust, Fixed Trap



When a trap does not need to be stored flat off-season, it may be better to make a rigid frame and attach plywood or other materials to form the trap. This type of trap is heavy enough to be stable in strong winds; it simply requires the wings to be staked in place. By using longer pieces than necessary for the three corners, the body of the trap can also be raised well off the ground for easy maintenance.

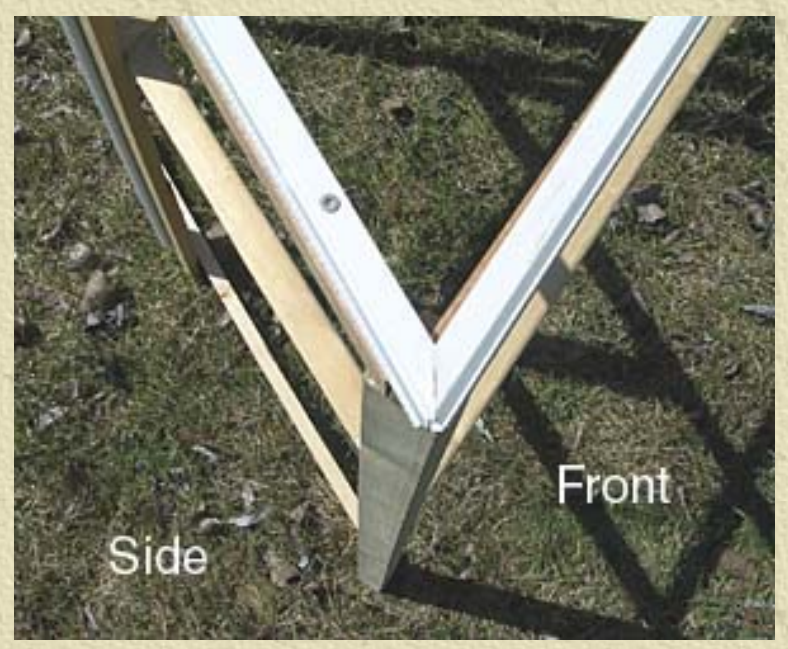
This frame was made with sturdy wood at the two front corners (4 ft deck rails) so that the wooden panels would be easy to attach with screws and hinges. A flat piece of wood was used in the middle to close off the side panel, and to provide a point of attachment for side window framing. A few metal braces were used to reinforce joints or to tighten up edges where adjoining pieces may warp with time.

A 6 ft, 2 x 2 piece of lumber was used at the back to stretch the netting, and to provide a suspension post for the cone. A light, horizontal piece of wood was attached to the post at the top with a corner brace to provide a suspension point for the cone.

Other pieces of the frame were made from 3/4 by 3/4 in hardwood gardening stakes or similar light lumber. The frame was measured and built with care so that all panels and framing would fit snugly, with no gaps through which flies could escape.

Examples of the connections at key points in the trap are shown below.

The front corner post should be even with the front cross pieces so that the top front panel can be screwed into it. Use a few right angle braces to make a tight connection between the cross pieces and the panel. The wing is attached on the side of the post with hinges and moves freely. The side



panel rests at an angle flush against the back edge of the post. Position it exactly and attach to the back of the corner post using hinges. Framing is attached along the top, which is cut from gardening stake. It is beveled at the corners to close the cone.

In the middle on the sides, use a broad piece of wood as a vertical brace to provide points of attachment for several components.

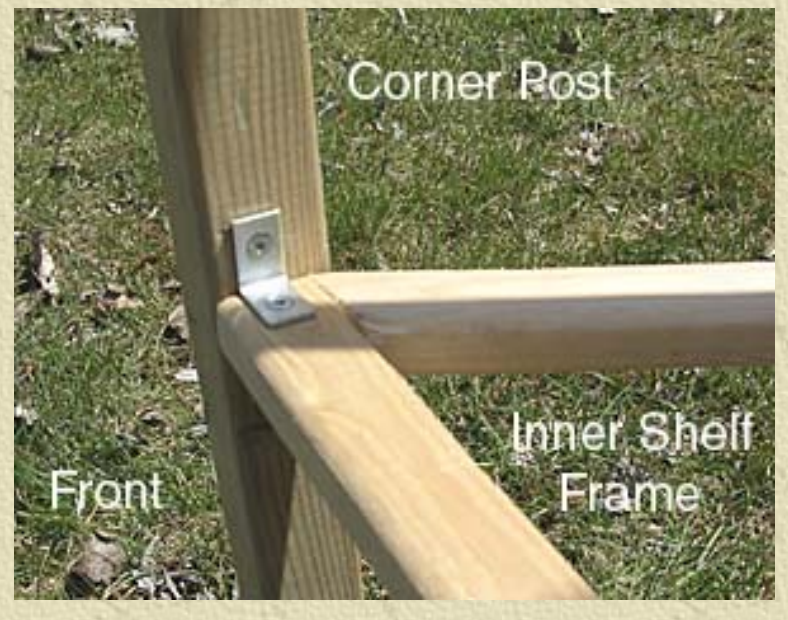
Attach the side panel flush against the outside surface with screws.

Attach two pieces of window framing along the side so that the cone and back netting do not need to be overlapped.

At the back, notch the back post so that all pieces will be flush with no gaps. Some flies focus their exploratory activity on this point, so it must be completely closed off.

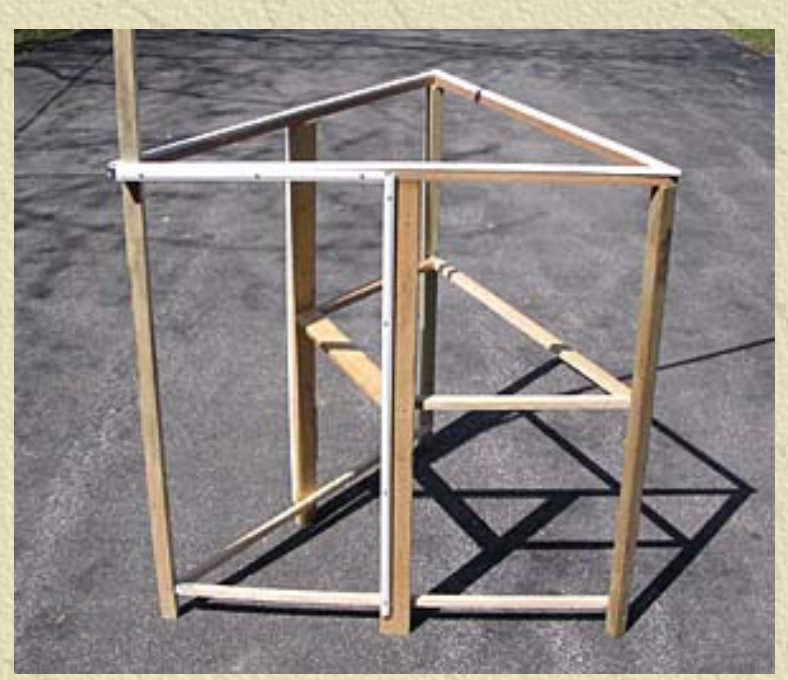
Extend the framing well back so that the cone will close up properly.

The netting should close up naturally and press against the post under tension from the splines. If not, wind transparent outdoor duct tape around this area.



The inner frame for the trapezoidal shelf is cut to fit; joints and connections should be reinforced with a few metal braces. The use of a frame instead of a solid panel of wood or other material is arbitrary. A frame allows one to test different kinds of netting or solid, transparent, or translucent inner panels.

There will be a small gap between the inner frame and the side of the trap. I close this up with the material that is attached to the inner frame to form the inner shelf.



The two struts at the sides along the bottom are attached to the inside of the posts. They strengthen the frame and form an edge for the possible addition of a triangular inner "floor". A floor of wood or plexiglass could be used to suppress growth of grass. Other materials (painted, reflecting, etc.) could also be used to entice flies to enter the trap, or to push them up towards the cone. I have not researched the use of a floor sufficiently to know the resulting effects on catches with different kinds of floors.

A completed, frame-based trap using nearly opaque blue and black 3/16 inch plexiglass panels instead of 3/8 inch painted plywood, with white polyester mosquito netting.

The frame is simply set on the ground;

the front wings are wired to a grooved metal stake driven into the ground. The trap is heavy, but can be carried. It has an inner transparent plexiglass shelf (out of view).

Material substitutions like this are part of ongoing experiments. This exact blue is the industry standard colour Rohm Haas #2114, which is a good match to phthalogen blue.

Updated
04-Feb-2007