



MNHO Tree Swallow Monitoring Program

September 2026, version 2.1



Maine Natural History Observatory
conducted in collaboration with
Maine Department of Inland Fisheries and Wildlife
& Swallow Conservation

Table of Contents

Introduction.....	1
Why Monitor Tree Swallows?.....	1
Natural History.....	1
Nest Box Monitoring.....	3
Where to Install Nest Boxes.....	3
Monitoring Protocol.....	4
Maintaining Nest Boxes.....	6
Competition with non-native birds.....	7
Competition with other wildlife.....	7
Reporting your results.....	8
Project Nest Boxes.....	8
Nest Boxes Design.....	9
Contact.....	13
Nest Box Monitoring Sheet.....	14



Introduction

Thank you for your interest in MNHO's Tree Swallow Monitoring Program. This is a project coordinated by MNHO in collaboration with Maine Aerial Insectivore Monitoring and Stewardship (Maine AIMS) initiative, a project of the Maine Department of Inland Fisheries and Wildlife. In response to risks posed to swallows by the increased frequency and intensity of hot spells associated with climate change, our project has adopted a modified nest box design (see page 9), which incorporates a wider floor plan to permit increased air flow and the addition of a PVC heat shield to mitigate heat and reduce nesting failure. By deploying and monitoring nest boxes in appropriate breeding habitat, we will gather insights into breeding outcomes of Tree Swallows in Maine while increasing the number of suitable nesting sites for this at-risk, cavity-nesting species.

Why Monitor Tree Swallows?

Like other aerial insectivorous birds, Tree Swallows are declining throughout their northeastern breeding range. Still widespread in Maine, they have experienced pronounced declines; Breeding Bird Survey data indicates an $\approx 88\%$ decline between 1966 and 2019 leading to their designation as Species of Special Concern and Priority 2 Species of Greatest Conservation Need in Maine. Reduced prey availability, habitat change, contaminant exposure, and shifting climate conditions likely affect reproductive success. Nest boxes are a primary management tool for this species, yet many nest boxes expose nestlings to thermal stress under increasingly variable temperatures. By monitoring nest boxes, we will gather vital insights into breeding outcomes while also evaluating the performance of nest box designs.

Natural History

Tree Swallows are a highly recognizable species with a long history of monitoring in North America. Although this species is most associated with open country (where

they forage), Tree Swallows historically relied exclusively on trees for their nesting sites. While this species continues to use the nesting cavities created by woodpeckers as secondary cavity nesters, nest boxes put out by people now play a large role in the species' breeding activities. Marshes, grasslands, and agricultural lands with suitable nesting sites nearby all provide breeding habitat for this charismatic species.



Historically, these birds nested in woodlands flooded by beaver activity where both dead trees and insects are numerous. Today, however, these birds can be found nesting in open habitats well away from water so long as suitable nesting sites are provisioned and adequate insect prey is available. Tree Swallow nesting boxes can be installed within grasslands, meadows, and other open habitats. These aerialists need adequate open space to pursue flies, leafhoppers, flying ants, mayflies, and other insects.

Male Tree Swallows arrive on the breeding grounds ahead of the females. Pairs form upon the arrival of females. Males locate suitable nesting sites and defend the site from competitors. They advertise themselves and their nest sites through singing a long, complex chattering song and through posturing near the nest site. Once a pair is formed, both members may add a few items to the nest site a few days or weeks prior to nest building. Although capable of nesting in close proximity to one another (100'), males will guard nest sites and will chase off competitors that enter the breeding territory. Copulation often occurs on a perch nearby the nesting site, sometimes on the nest box itself.

Nests are typically composed of dry grasses, but also include feathers, rootlets, animal hair, and pine needles. Females are typically responsible for gathering materials and constructing the nest. After egg laying, nests are provisioned with the feathers of gulls,

waterfowl, and domestic birds. They are also responsible for incubating eggs with incubation lasting ~14 days. After hatching, nestlings typically remain in the nest for 15-25 days before fledging. After fledging, young birds will often remain with their parents (who will continue to feed them) for several days. Although Tree Swallows typically raise one brood each year, they may renest after a failed attempt. Although rare in the north, they can sometimes raise a second brood.



Nest Box Monitoring

We are asking volunteers to install nest boxes in suitable habitat and to monitor these boxes throughout the breeding season. The breeding season is a sensitive time for nesting birds. The safety of monitors, nesting pairs, and their young is a priority. It is important to adhere to the monitoring protocol to best ensure a successful season for all parties. It is important to remember that if your nest box remains unoccupied, this is still important information. If no birds take up residence in a nest box this season, that is okay. The data you collect can still be used to inform our effort. Allow the birds some time to find your box. If your box remains unused after two or more years, it is likely worth trying the box at a new location.

Where to Install Nest Boxes

Tree Swallow nest boxes should be installed on a post or pole near wetlands, lakes, rivers, or grassland areas. Grassland sites near water and with large areas of unmowed grass are especially suitable. Sites with extensive tree cover and limited open space for foraging should **not** be used. Nest boxes should be installed in areas with limited human activity to avoid disrupting nesting pairs.

Nest boxes should be installed between 5' and 6' in height on poles or posts (not trees) equipped with baffles or 20" of aluminum flashing. If using metal poles, poles can be greased with an unscented petroleum jelly to prevent climbing predators. Ideally, they should be installed with their entrances facing south or east and be easily viewable from 30' away. Birds should have a clear flight path to the box. While volunteers are welcome to monitor more than one box, each box should be installed at least 100' (30 m) apart. If competition with another swallow or other native birds arises, consider adding an additional box to the site to accommodate more nesting pairs.

Poorly selected sites put birds at risk. Install boxes at least 75' (23 m) from busy roadways. Place them at least 150' (45 m) from forest edges, shrublands, and hedgerows to reduce competition with House Wrens and predation by raptors and other predators. It is impossible to avoid all potential predators at a given site, but pay particular attention if the area has outdoor cats and choose a location where cats cannot access the nest box.

Nest boxes should **only** be installed if the volunteer intends to monitor and maintain the box throughout the season. Unattended boxes can be detrimental to swallows and other birds. For more information on how to handle these situations, see "Maintaining Nest Boxes" (page 6).

Monitoring Protocol

The Tree Swallow breeding season runs from approximately May 1st until July 15th in Maine. These dates indicate the time period where most migrating birds have already reached their breeding grounds. As such, these dates can roughly serve as the start and end date for conducting nest box monitoring. Nest boxes should be installed by April 15th to best ensure that the box is considered by arriving males.

It is important to remember that nest boxes are not always used immediately after they are put up (less than 50% of boxes may be used in the first few years), but do not let that discourage you from taking part. Perseverance is key as it can take time for birds to find a nest box and select a site for nest construction.

Observations of your nest boxes should commence once swallows arrive at the site in the spring. Regular box monitoring checks should be conducted at least once per week once in use, ideally twice per week (2-3 days apart) when possible. Box checks should be brief (<1 minute per box). All observations should be immediately entered onto your monitoring data sheet to avoid errors or omissions. Follow these instructions to gather the necessary data and limit disruption to nesting swallows:

- Conduct your checks after 9:00 AM and before sunset.
- Approach the box from the side when possible.
- Open the door gently and just enough to see inside.
- If an adult is in the box, close the door carefully and return after they exit the box.
- If no adult is present, open the door fully and conduct your box check.
- To avoid premature fledging, suspend box checks once nestlings reach 12 days old.

Record the following:

- Date and Time
- Box Identification (give each box a unique identification)
- Species
- Nest construction stage (use "Nest Construction Codes" noted below)
- Number of Eggs and Number of Young
- Remarks

Nest Construction Codes

MT = empty box

FG = few grasses or other vegetation

1/4 C = ring present, but incomplete

1/2 C = ring built, but cup lacking vegetation

3/4 C = nest cup is shaped, but floor still visible

CC = complete nest cup and floor covered

FF = few feathers

SF = some feathers

MF = many feathers

VMF = very many feathers

CM = complete

While conducting visits to the nest box, it is important to work efficiently and quietly. The amount of time spent at the open nest box should be limited to the time it takes to make your counts and no longer. Do not touch the birds or reach into the box during your box check. Simply record what you are able to see from the box opening. After completing your box check, move at least 30' (10 m) away from the box to allow adults to return to the box.

If a nestling prematurely falls from a box during a nest check, carefully place it back into the nest cup and gently close the box. If a dead adult or nestling is found within the nest box during a box check, it should be removed (while wearing gloves) and disposed of >100' from the box to avoid attracting predators to the site.

Maintaining Nest Boxes

Proper maintenance of the nest box is just as important as nest box placement. Nest boxes should be cleaned and, when necessary, repaired between seasons. At the end of the season (once all the young have fledged and the nest box is unoccupied), take down the nest box. Aiming to remove the box by August 15th should allow adequate time, however, leave the box up longer (2-3 weeks) if the box is still being used by nesting songbirds.

Leaving the box up between seasons could mean squirrels, wasps, mice, or other wildlife could nest or shelter within the box. Remove the box from the post or pole (or remove with the pole still affixed and mark the location), empty it of any nest materials (while wearing gloves) while taking care not to breathe any of the dust that stirs up, and store the nest box in a dry, protected place until the next field season. Do not use any cleaning solutions when cleaning out the box. If there is a build-up of debris stuck inside the box, use warm water and stiff-bristled brush to clean out the box (dry in the sun before storing).

Competition with non-native birds

Introduced species such as House Sparrows and starlings compete with native species for nest boxes. House Sparrows have been documented killing adult swallows. While the 1 1/2" diameter box entrances may help exclude some larger bird species, they will not exclude House Sparrows. Introduced species threaten native wildlife and are therefore not protected by state or federal laws. There are two options monitors may employ in the event that invasive bird species take up residence in Tree Swallow nest boxes:

- Option 1: Nest box removal. Once an invasive species moves into the box, it is very unlikely that swallows will use the box that same field season. Therefore, volunteers who are comfortable doing so are encouraged to remove nest boxes for the season and dispose of any materials, nests, and eggs associated with an invasive species discovered in a nest box. These contents should be disposed >100' away.
- Option 2: Continue observations. While preventing invasive species from nesting is the ideal solution, some monitors may not be comfortable disposing of nesting materials and eggs. If that is the case, you may continue your observations.

If one of these non-native or any other native species takes up residence in your nest box, note the species in the remarks section on your data sheet. If a native bird species takes up residence in the box, simply make note on your data sheet and continue your observations. Native bird species nesting in boxes should **never** be disrupted regardless of if they are the box monitor's intended or desired species.

Competition with other wildlife

Occasionally, you may discover other forms of wildlife in your nest boxes. These may include mice, squirrels, snakes, and insects such as wasps and ants. Ant infestations can lead to failed nesting attempts. Animals can be removed from the nest box if you are comfortable doing so. Should you decide to remove these animals, proper safety precautions should be exercised during this type of maintenance. If rodent nests are found within the box, remove the contents with gloved hands. Small paper wasp nests can be manually removed from boxes and destroyed with a gloved hand.

Do not use any insecticides to exterminate insects as these products may contain chemicals which can be hazardous to nesting birds using the box. Ants can be manually swept from the box if found early. Large stinging insect nests will likely have to be removed at the end of the season. Unless discovered and removed quickly at the beginning of the season, the presence of many of the animals discussed above will likely mean swallows do not use the nest box this field season. Any box which is invaded by these non-bird animals should be relocated to a new location the following field season. Please do not risk injury to yourself for the sake of nest box maintenance.

Reporting your results

Send your completed datasheets to Maine Natural History Observatory at the end of the field season (MNHO, 2640 North Palermo Road, Palermo, ME 04354). Scans of completed datasheets can be emailed to logan@mainenaturalhistory.org. These results will be shared with the Maine Aerial Insectivore Management and Stewardship initiative (Maine AIMS).

Project Nest Boxes

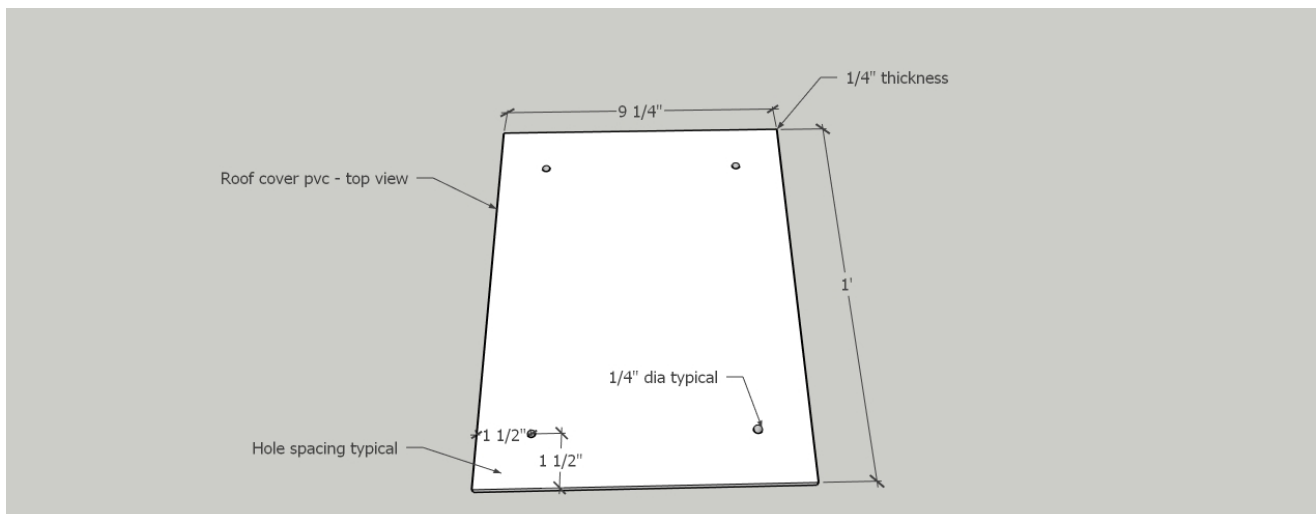
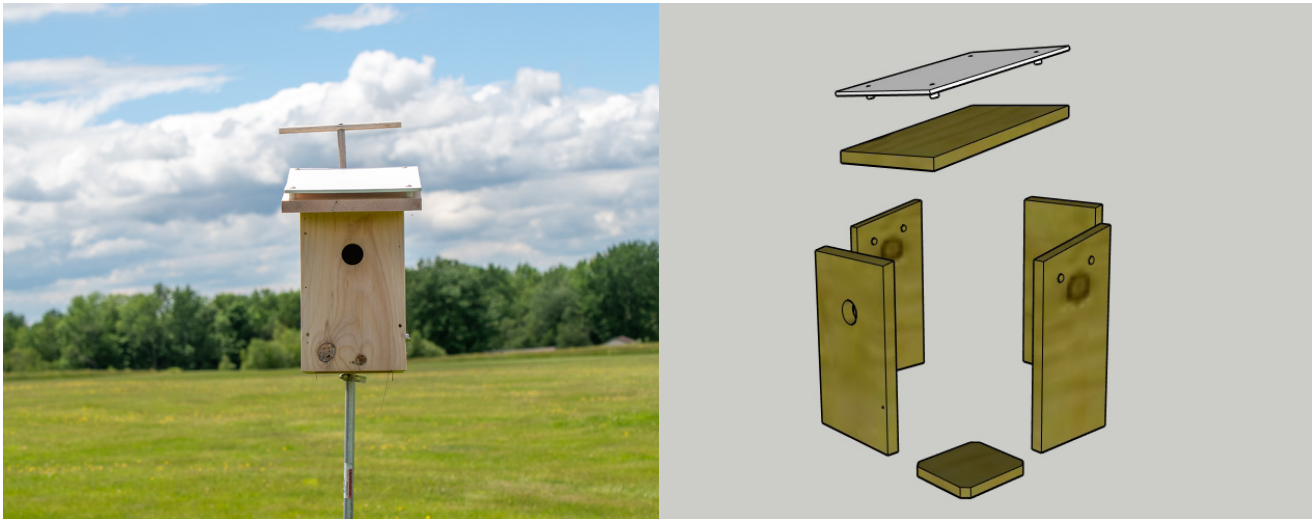
A good nest box design must be secure from predators, weather resistant, relatively simple and inexpensive to construct, monitor, and maintain, and suitable for the intended bird species to successfully fledge young. The plans used by this project were provided by Swallow Conservation. A limited number of boxes may be available to project staff and volunteers (See Contact, page 13). Nest box construction details can be found within this handbook (see Nest Box Design, page 9).

Tree Swallow nest boxes are vulnerable to extreme heat due to their exposed nature. Heat stress may negatively impact swallow breeding attempts, particularly during extreme weather events. Beginning in 2026, we modified our nest box design, incorporating a wider floor plan to permit increased air flow and by adding a PVC heat shield to mitigate heat and reduce nesting failure due to extreme weather. The preliminary results from field testing has been promising. Modified nest boxes averaged $\sim 4^{\circ}$ F cooler than the conventional nest box during periods of hot weather.

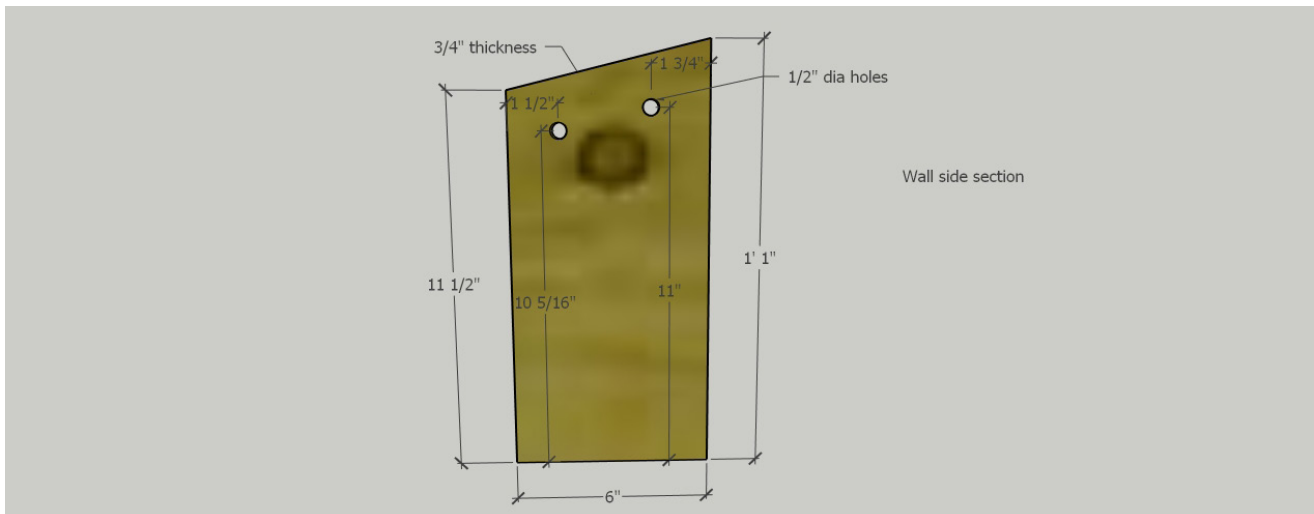
Nest Box Design

Required Materials

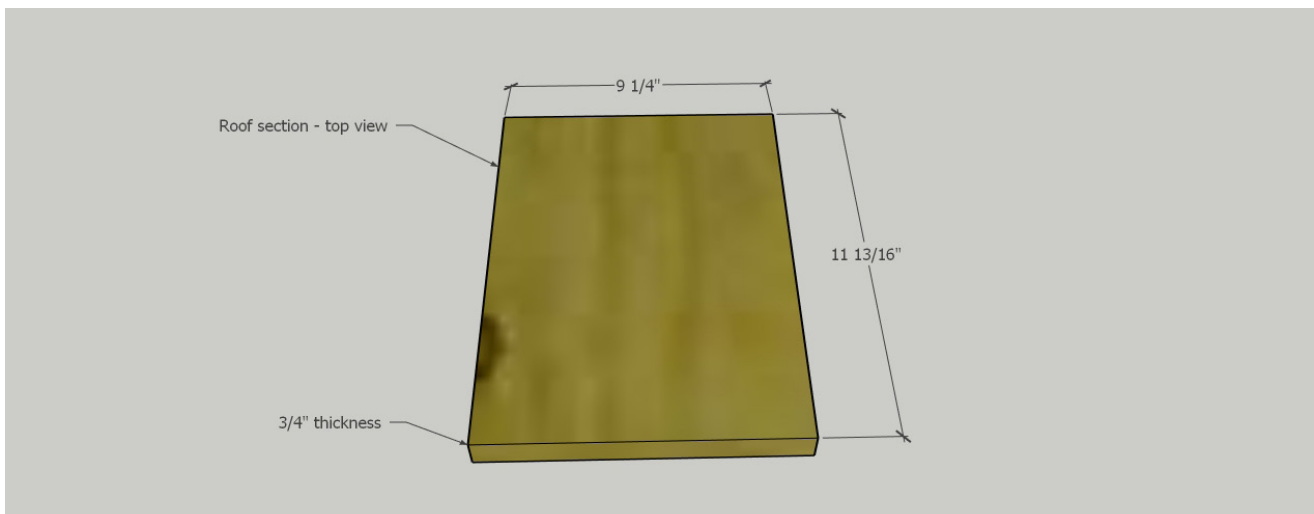
- (1) 7" x 3/4" x 8' pine or cedar board
- (1) 9 1/4" x 1/4" x 12" pvc white panel (for roof cover)
- (4) 1/2" nylon spacers
- (2) 1 1/2" galvanized trim nails (for hinge pins)
- (17) 1 1/2" stainless steel or exterior deck screws



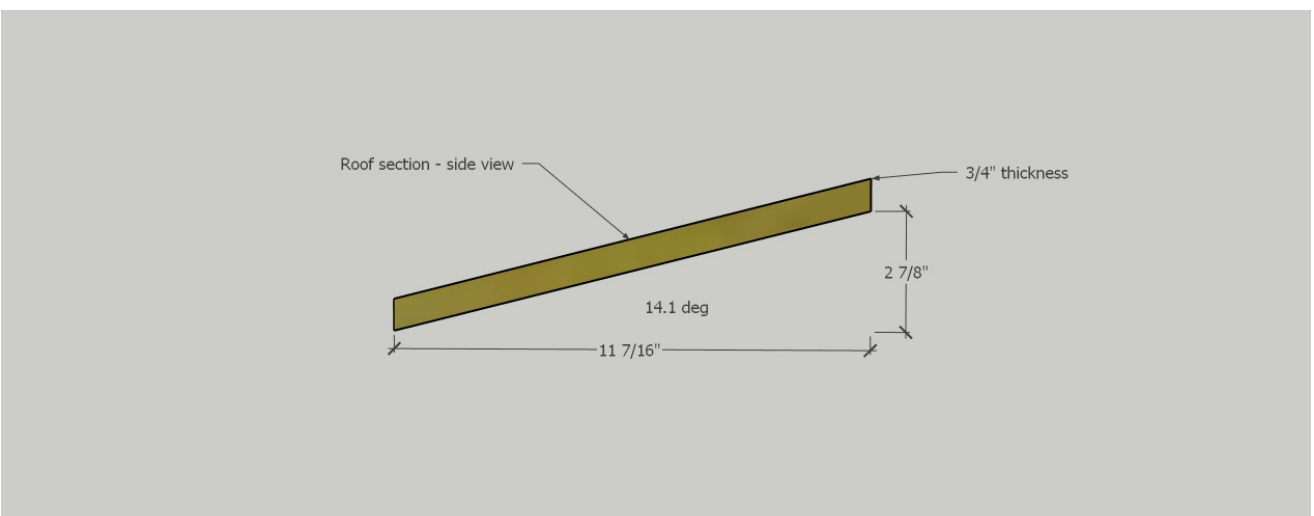
PVC roof panel dimensions and layout.



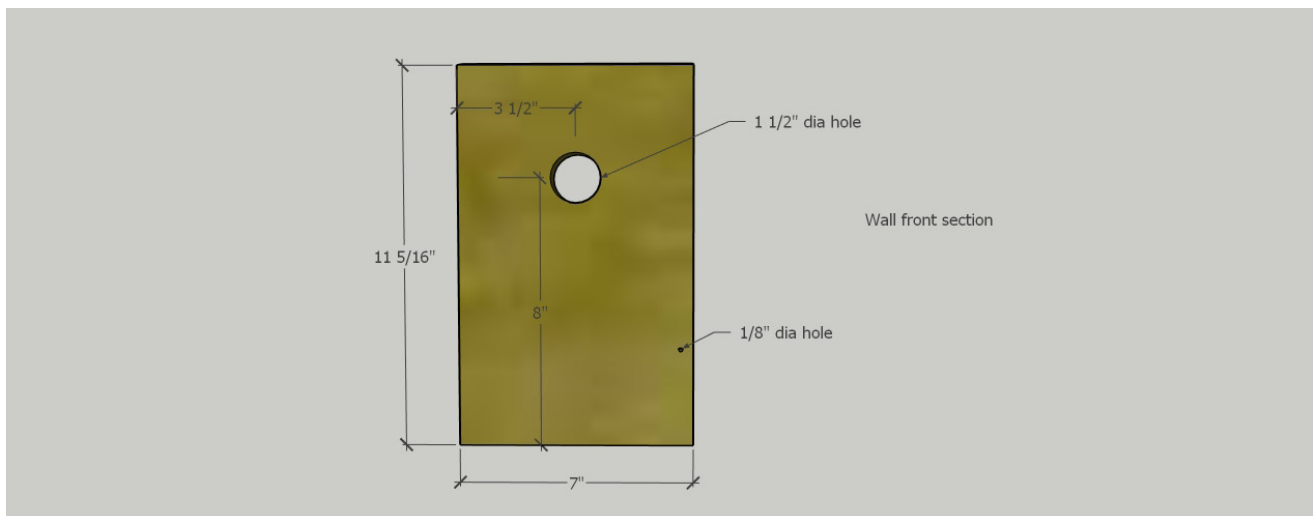
Wall side dimensions and layout. Note: the left wall side will be secured with screws while the right side (opening side) will be affixed with nails to serve as hinge pins.



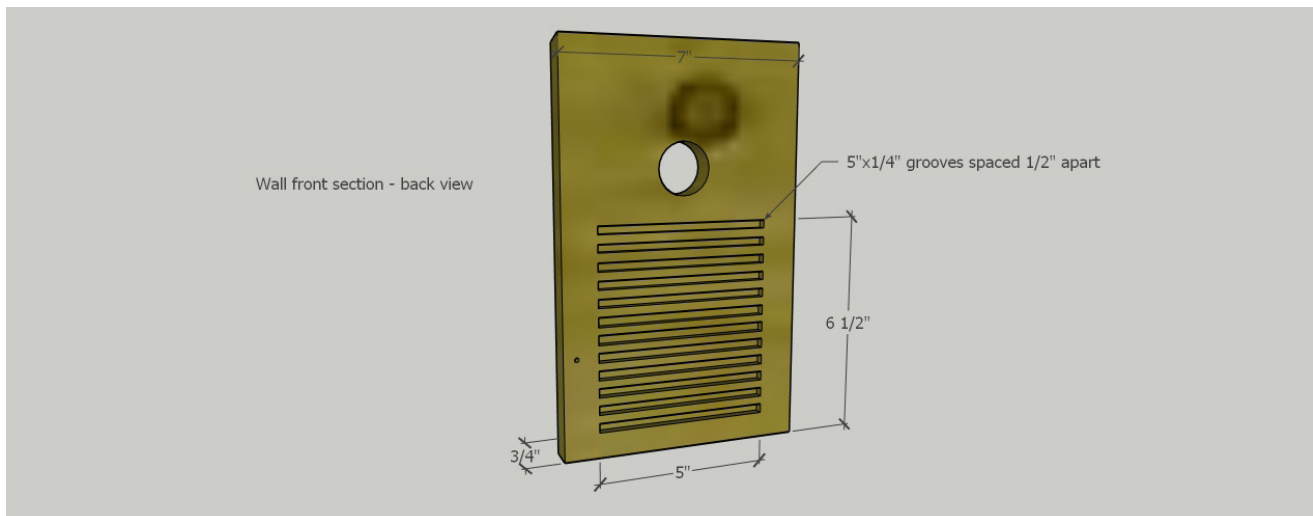
Roof section dimensions and layout (top view).



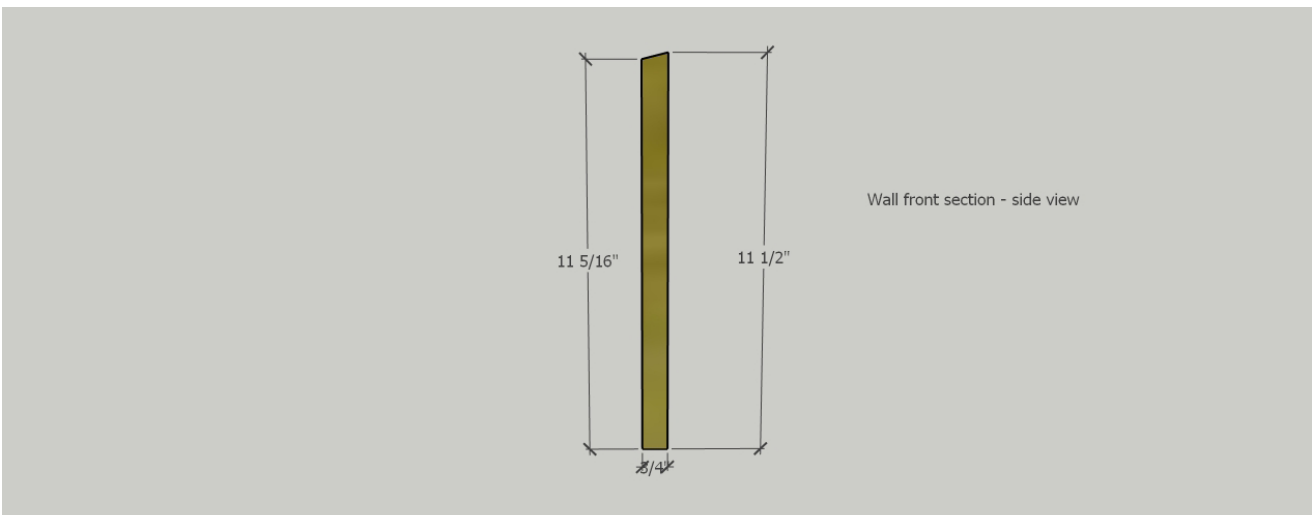
Roof section dimensions and layout (side view).



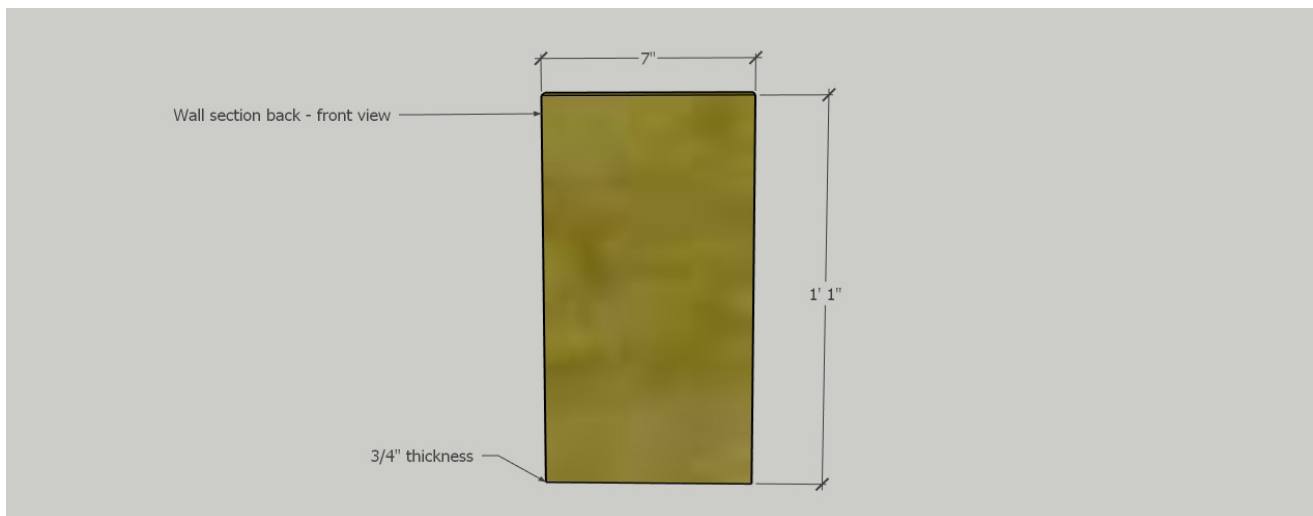
Box front dimensions and layout (front view).



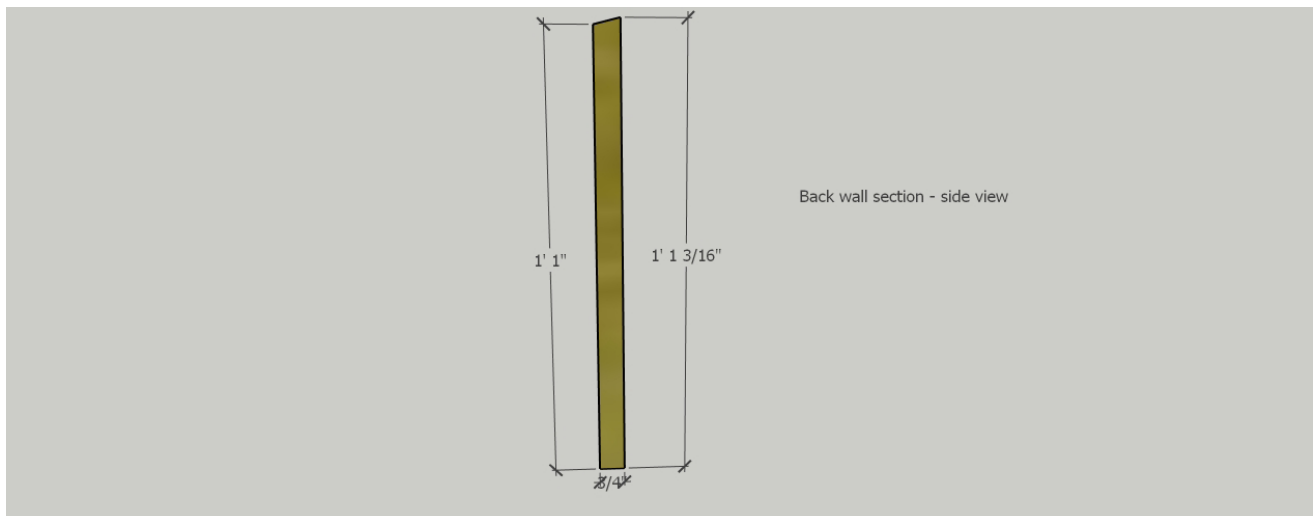
Box front section dimensions and layout (back view). Note: scoring grooves on the interior of this section is essential to allow nestlings to climb to box opening.



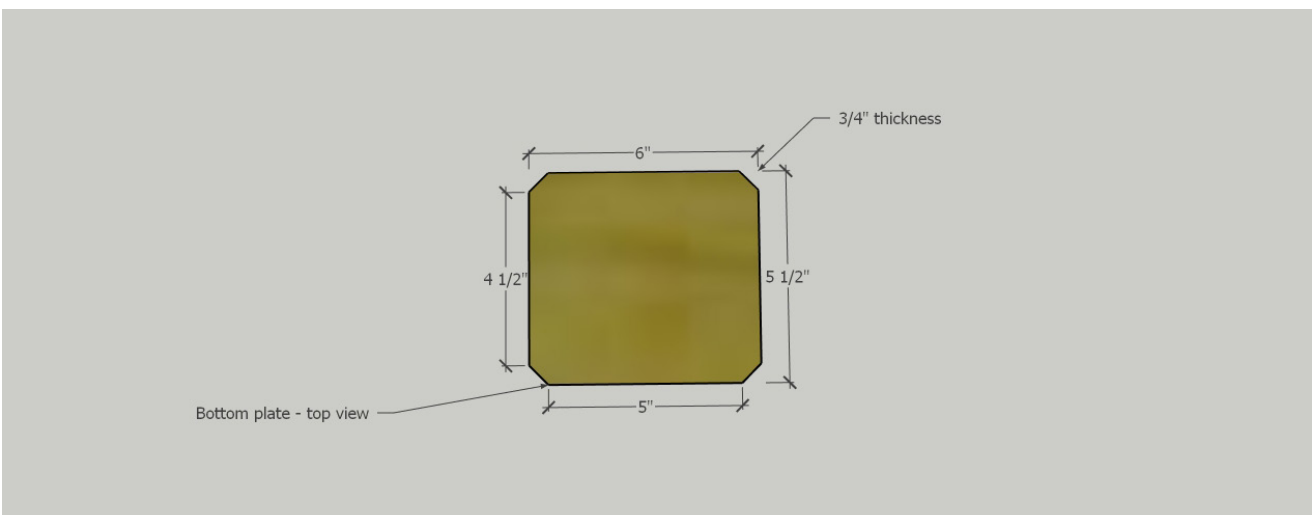
Box front section dimensions and layout (side view).



Box back dimensions and layout (front view).



Box back section dimensions and layout (side view).



Box bottom plate dimensions and layout (top view). Note: trimming the floor corners is essential to ensure increased air flow and water drainage.



Contact

For inquiries related to this project, contact:

Logan Parker, Ecologist

Maine Natural History Observatory

logan@mainenaturalhistory.org

Email scans of completed data sheets to:

logan@mainenaturalhistory.org

or mail to:

MNHO

2640 North Palermo Road

Palermo, ME 04354



MNHO Tree Swallow Monitoring Program

Nest Box Monitoring Sheet

Species _____

Box # _____

[illegible]

Send scans of completed monitoring sheets to logan@mainenaturalhistory.org or
mail to MNHO, 2640 North Palermo Road, Palermo, ME 04354