Sullivan Lake Aquatic Habitat Enhancement Plan

Sullivan County

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INTRODUCTION

Sullivan Lake is a 451-acre impoundment located in Sullivan, Indiana. The reservoir was constructed between 1967 and 1968 by the U.S. Army Corps of Engineers to provide flood control and recreation. The maximum depth of Sullivan Lake is 20 ft and the average depth is approximately 9.5 ft (Figure 1). The fishery at Sullivan Lake supports a fish community consisting primarily of Gizzard Shad, Bluegill, Largemouth Bass, White Crappie, and Channel Catfish. The lake is also stocked with Hybrid Walleye.

The Sullivan County Park Board maintains the lake and adjacent park while the majority of the shoreline is private. Sullivan Lake has been documented as having poor water clarity, sedimentation issues and shoreline erosion (International Science & Technology 1991; Schoenung 2002; and Williams Creek Consulting 2010). The Lake and River Enhancement Program has funded several projects with the Sullivan County Park Board to address many of these issues but lack of aquatic vegetation persists (King 2015). In an effort to create more aquatic habitat within Sullivan Lake, Bass Unlimited has been deploying Christmas trees in the lake for the last several years (Figure 2). Even though Christmas trees provide quality habitat, they only have a lifespan of 3 to 5 years. In order to create a measurable increase in the amount of aquatic habitat, DFW recommends a more aggressive approach using a combination of structures that will provide long lasting habitat (Figure 3). Many states already have established aquatic habitat enhancement programs and our recommendations are based on their work (Houser 2007, Wagner 2013, Kansas Department of Wildlife 2015). Descriptions, building specifications and costs of proposed structures can be found in the Appendix.

This project will begin in 2016 and will continue through 2017 if needed and will focus on the area of the lake south of the East County Road 300 North causeway (Figure 1). The average depth of this portion of the lake is only 9 ft and during summer months oxygen is only adequate to 6 ft. Because of these two factors the Habitat Enhancement Zone is designated as the area between the 6 ft and 10 ft contour and is about 69 acres or 15% of the lake volume (Figure 3). The proposed structures will enhance approximately 9 acres of habitat or 13.5% of the Habitat Enhancement Zone (Clark-Kolaks 2016).

The construction and placement of all artificial structures in this plan must be coordinated with the Indiana Division of Fish and Wildlife. Representatives of the Fisheries Section (or a designated representative) will be on hand to supervise and assist in construction and placement

of all artificial habitats designed for this project. All artificial habitats must be constructed to the specification shown in the standard drawings attached to this plan packet.

The Division of Fish and Wildlife will obtain a two-year (2016-2017) Individual Section 401 Water Quality Certification from the Corps of Engineers and Indiana Department of Environmental Management. This plan has been reviewed and approved by the Division of Water and Division of Law Enforcement.

LITERATURE CITED

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Submitted by: Sandra Clark-Kolaks, Southern Fisheries Research Biologist
Date: October 21, 2015

Approved by: Daniel P. Carnahan
Daniel P. Carnahan, South Region Fisheries Supervisor
Date: February 2, 2016

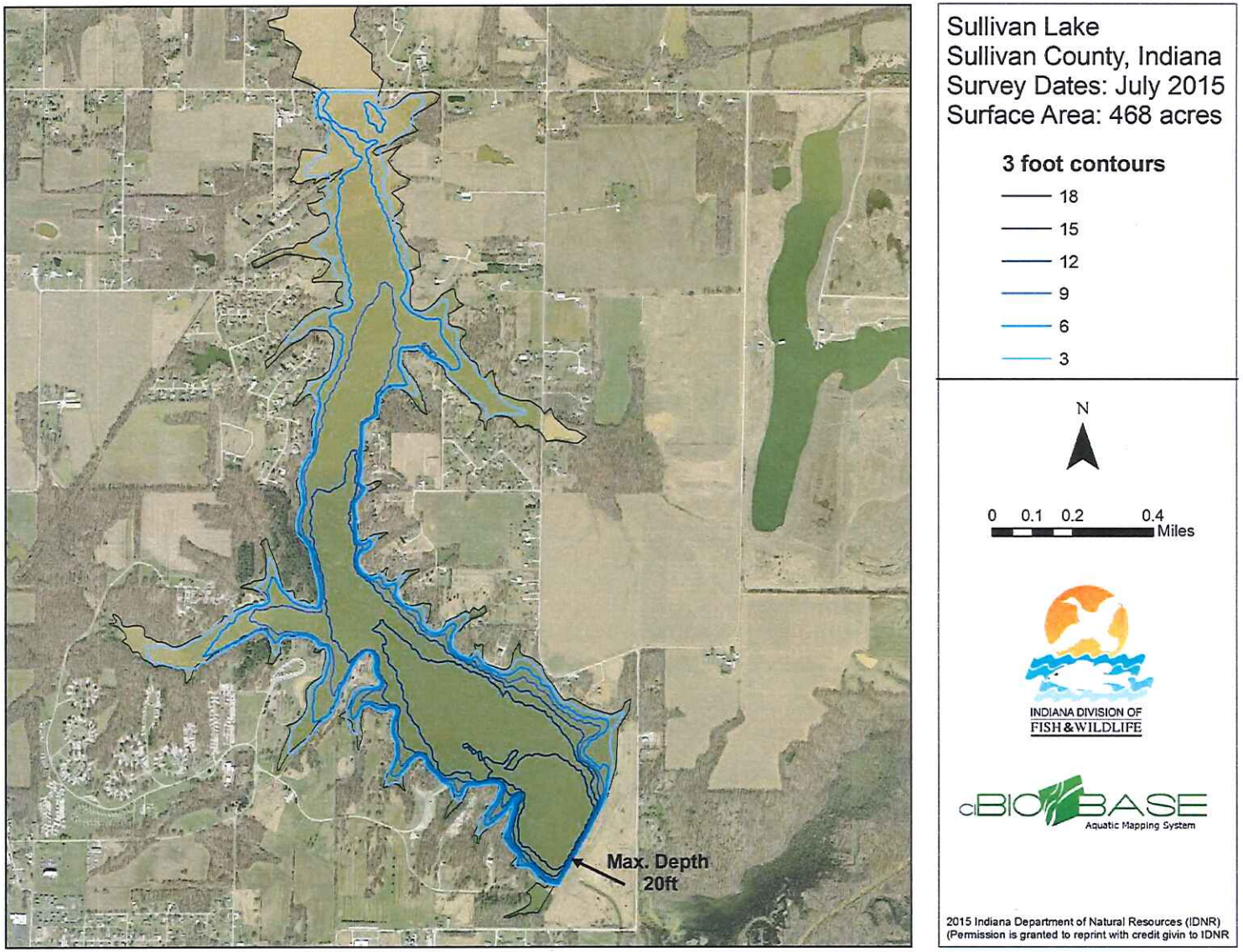


Figure 1. Bathometric map of Sullivan Lake using 3 foot contours.

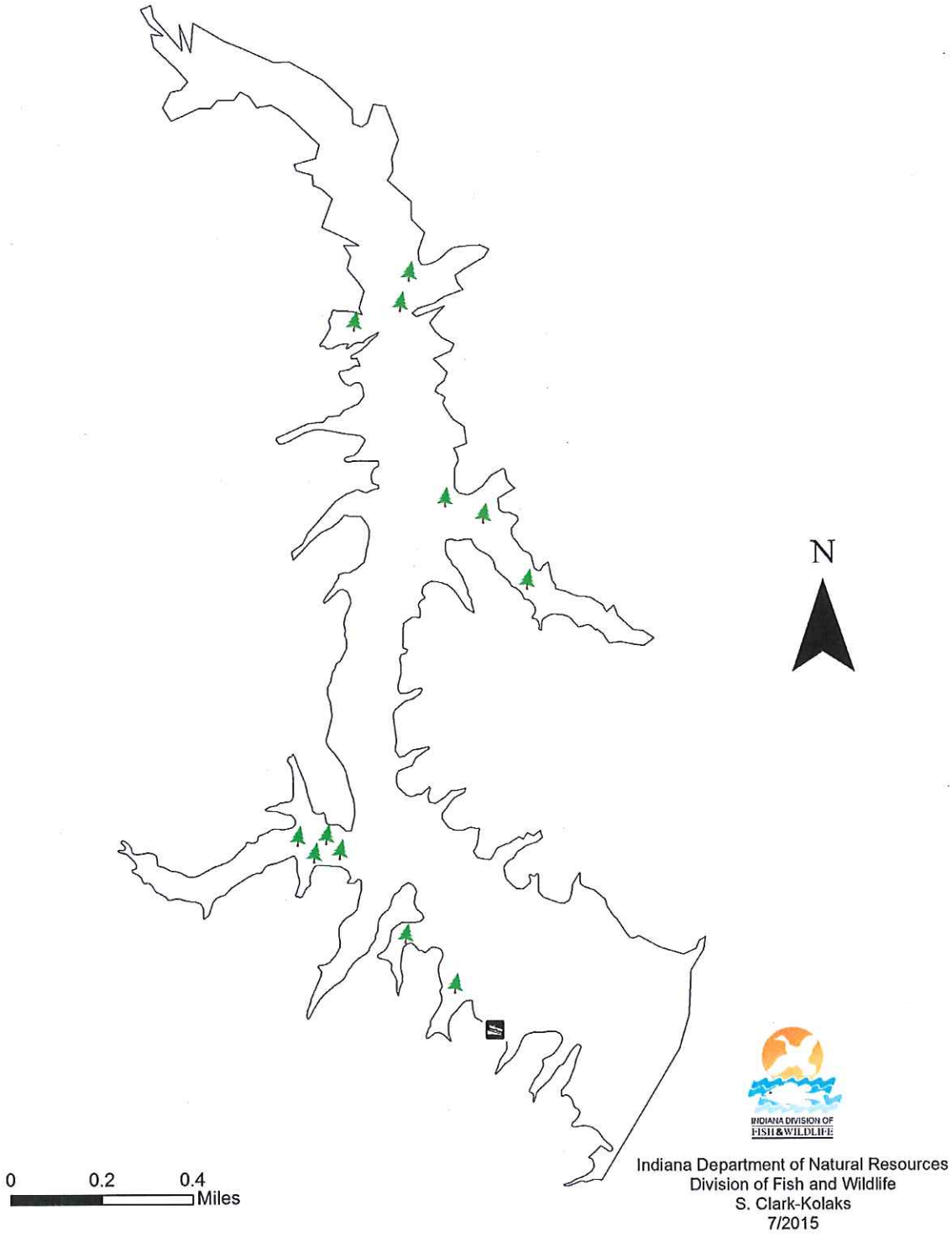


Figure 2. Locations of Christmas trees deployed by Bass Unlimited.

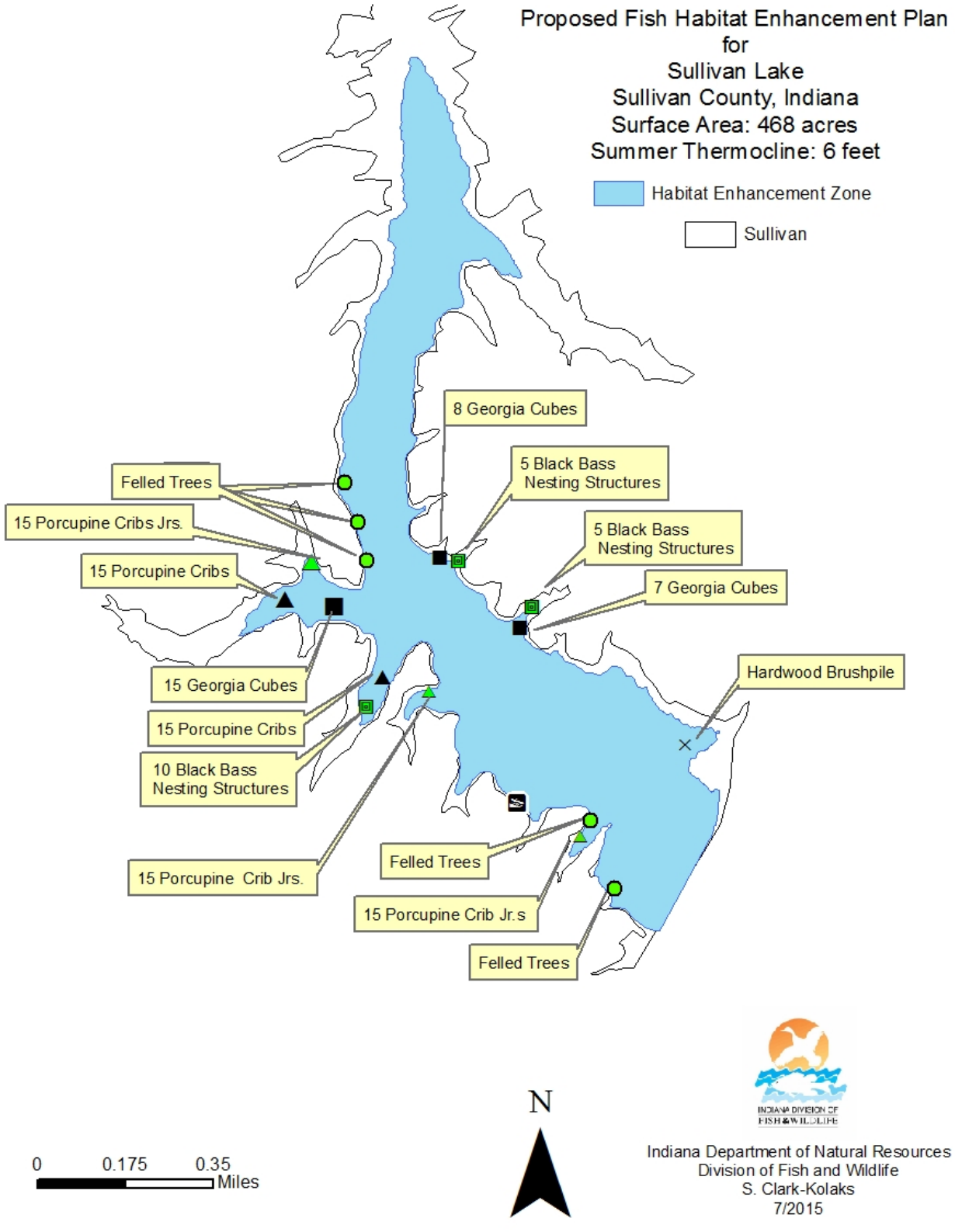
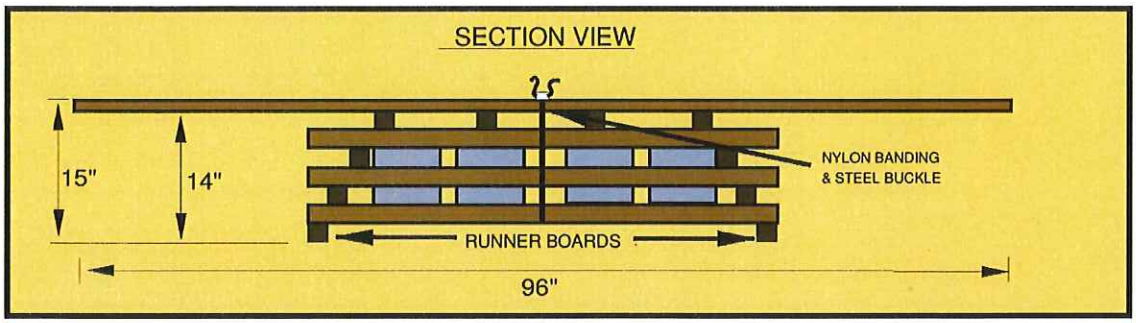


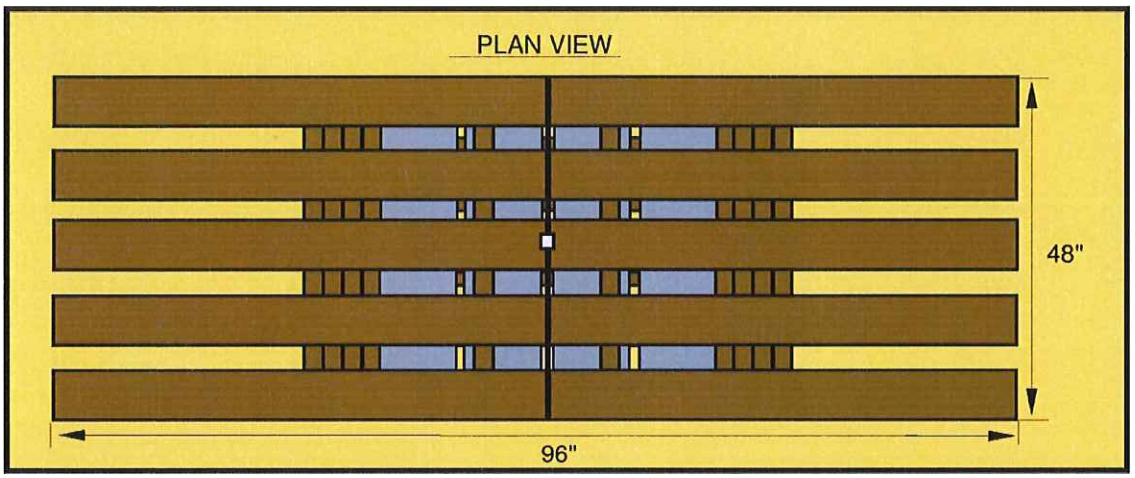
Figure 3. Proposed fish habitat enhancement plan for Sullivan Lake.

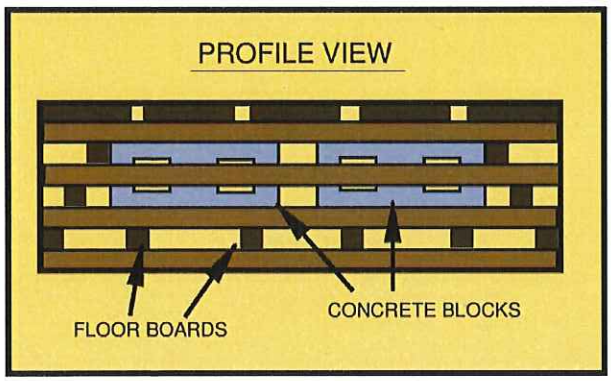
Appendix

Pennsylvania Black Bass Nesting Structures
Felled Shoreline Trees
Georgia Cube
Hardwood Brushpile
Pennsylvania Porcupine Crib
Pennsylvania Porcupine Crib Junior
Budget

PENNSYLVANIA BLACK BASS NESTING STRUCTURE (Houser 2007)





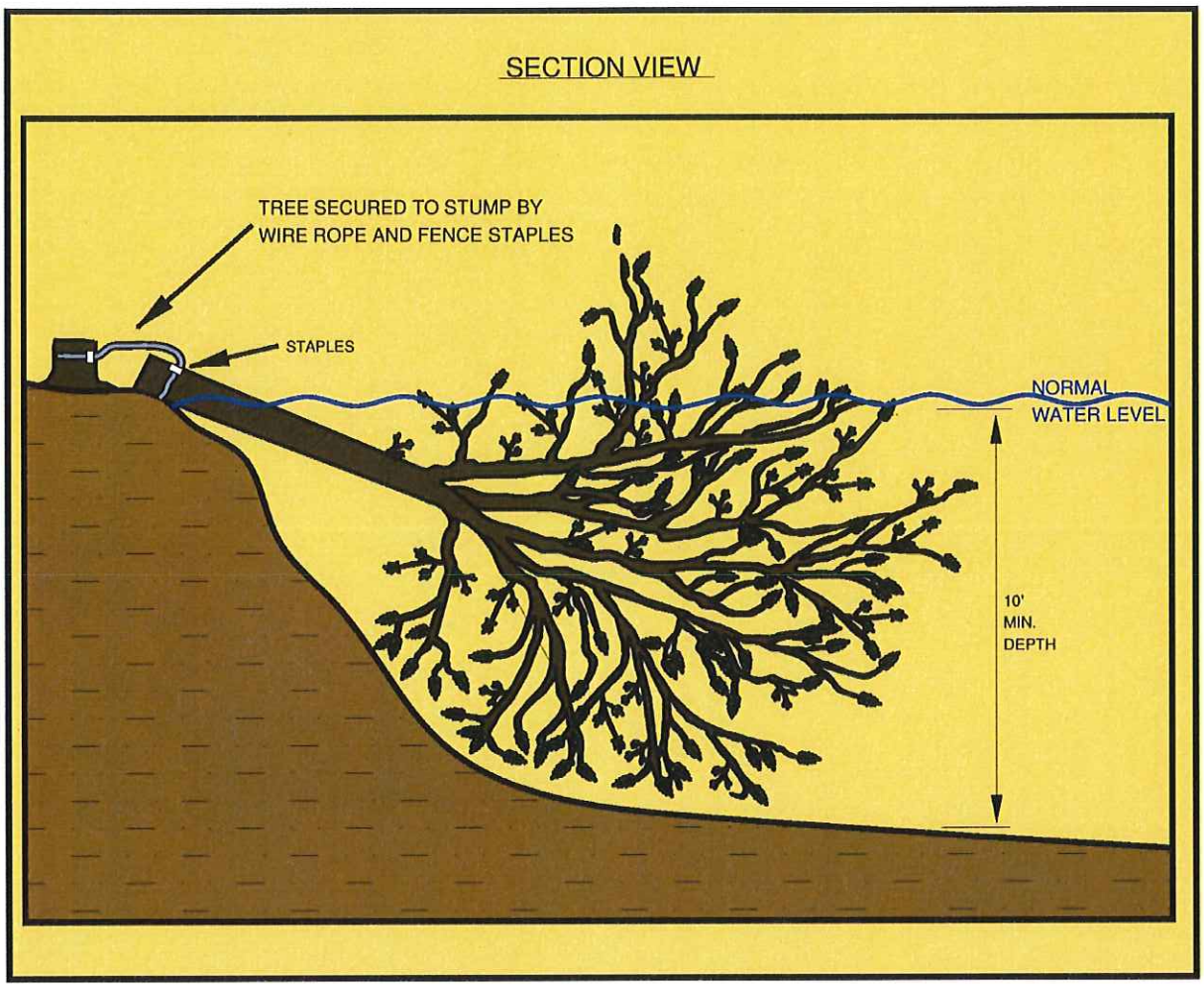


MATERIALS AND NOTES

MATERIALS:
ROUGH CUT HEMLOCK LUMBER 2" X 2" X 4' - 20 PIECES
ROUGH CUT HEMLOCK LUMBER 1" X 8" X 8' - 5 PIECES
8" X 8" X 16" 2 CORE CONCRETE BLOCKS- 8 TOTAL
COMMON NAILS (16D) - 2 LB
COMMON NAILS (10D) - 1 LB
NYLON BANDING- 18'
STEEL BUCKLE- 1 TOTAL

NOTES:
LUMBER MUST BE TRUE DIMENSIONAL
LUMBER MUST BE GREEN (FRESH CUT)
YELLOW POPLAR MAY BE SUBSTITUTED FOR HEMLOCK
CONCRETE BLOCKS MINIMUM WEIGHT: 35 LBS
NYLON BANDING: 600 LBS TENSILE STRENGTH
NOT TO SCALE
ALL SIZES ARE APPROXIMATE
FIT IN FIELD

FELLED SHORELINE TREES (Houser 2007)



MATERIALS AND SUGGESTED EQUIPMENT

MATERIALS:
LARGE HARDWOOD TREE - 1 PIECE
1/4" GALVANIZED CABLE 20' - 1 PIECE
FENCE POST STAPLES - 4 TOTAL

SUGGESTED EQUIPMENT:
CABLE CUTTERS
CHAINSAW
WEDGES
MINI SLEDGEHAMMER

NOTES

NOTES:
WIRE ROPE AND STAPLES MUST BE USED
TREES SHOULD BE CUT IN SUMMER WHEN THEY HAVE MAX. FOLIAGE
TREE CANOPY SHOULD BE MOSTLY SUBMERGED
TREES SHOULD BE CUT BY PROFESIONALS
AREA MUST BE RESTRICTED TO OTHERS DURING THE CUTTING
NOT TO SCALE
ALL SIZES ARE APPROXIMATE
FIT IN FIELD

GEORGIA CUBE (Kansas Department of Wildlife, Parks and Tourism 2015)

Cube Fish Attractor Materials

Materials to build 1 attractor

8 – 1½" dia. PVC deep fit* elbows

8 – 1½" dia. PVC deep fit* "T's"

40ft. - 1½" dia. sch. 40 PVC pipe

100ft. – 4"dia. Corr. drain line

10 high tensile strength zip ties**

80 – 1" **self-tapping** screws

1 - 8"x8"x16" concrete block

Heavy duty PVC cement

* - deep fit has a larger lip on the fitting, allowing for a better fit compared to shallow fittings.

** - lower tensile strength zip ties break under the stress of deploying the attractor.

Construction:

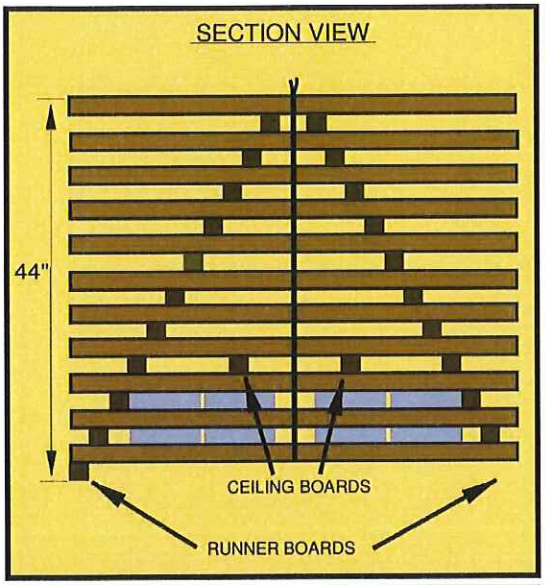
1) The 1.5 in white PVC pipe comes in 10 ft lengths. Cut 3, 3 ft lengths from each 10 ft piece of PVC. The remaining 1 ft piece can be cut into 2 to 3 in pieces, which will be used to connect some of the fittings.
2) Connect and glue the 3 ft white PVC pipe to the fittings to form a cube frame. Use the self-tapping screws to reinforce the glued fittings (see photo below).
3) Drill several 3/8 in holes in various locations around the completed PVC frame. This will allow it to fill with water when deployed – making it easier to sink.

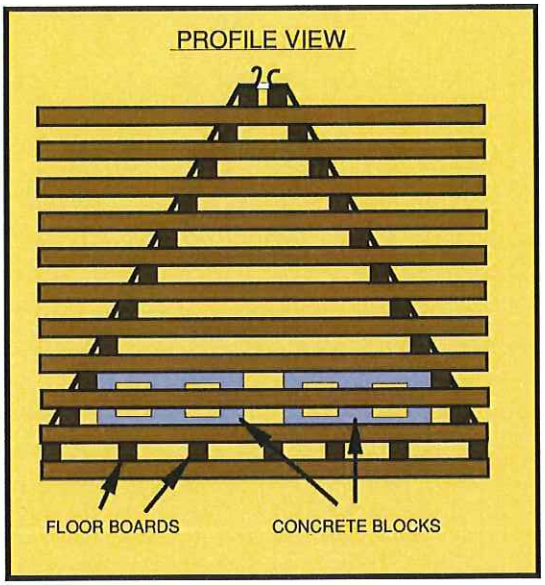
4) Once the PVC frame is complete use a heavy-duty zip tie (or aluminum wire) to attach one end of the 100 ft piece (uncut) of black corrugated drain line to the PVC frame.
5) Once the end of the corrugated drain line is attached to the PVC frame, begin to push the corrugated drain line in and out of the PVC frame. Use additional zip ties to attach the corrugated drain line to various locations on the PVC frame. Use the entire 100 ft length of corrugated drain line. It does not matter how the corrugated drain line is strung through the PVC frame. It is simply providing the cover for the fish to hide in.

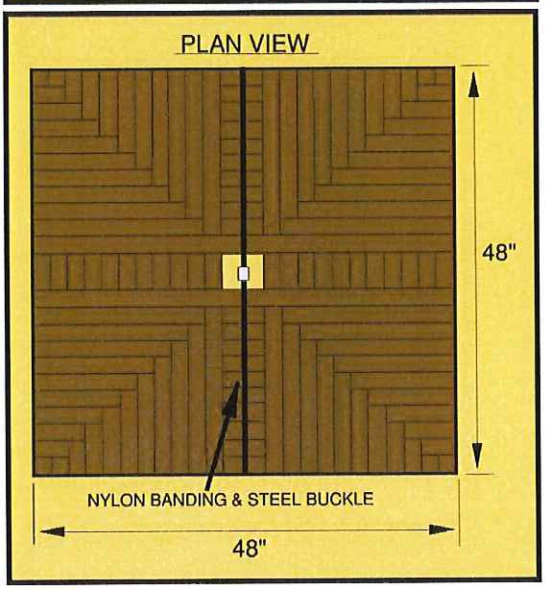
HARDWOOD BRUSHPILE

Brush piles can consist of brush, shrubs, branches, or small tree tops bound together with polypropylene rope and weighted with concrete building blocks. Trees can be arranged to create artificial structure rows. The rows should be two to three trees wide, with a two-tree space every seven to nine trees. The space between tree structures in both structure formation types allows space for predators such as White Crappie and adult Largemouth Bass to hunt or lay-in-wait.

PENNSYLVANIA PORCUPINE CRIB (Houser 2007)





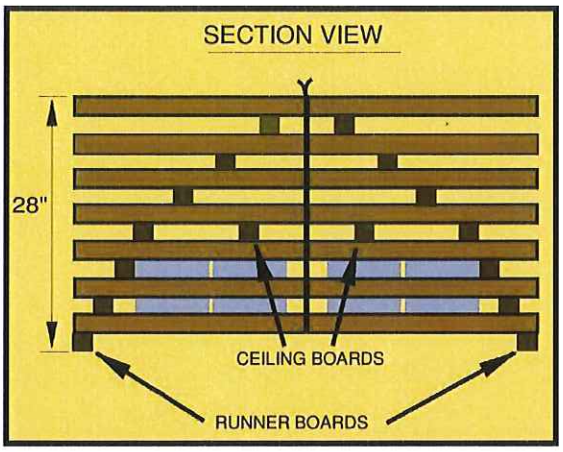


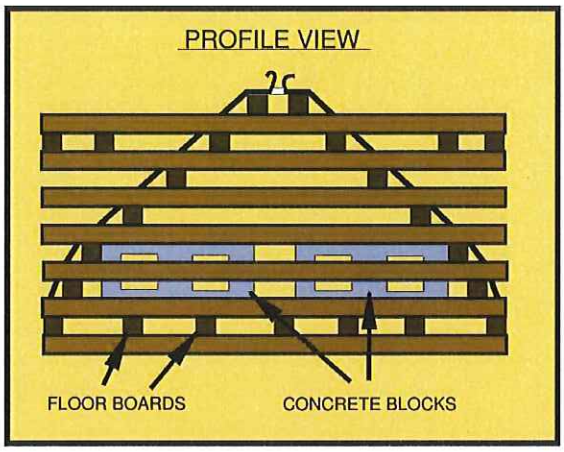
MATERIALS AND NOTES

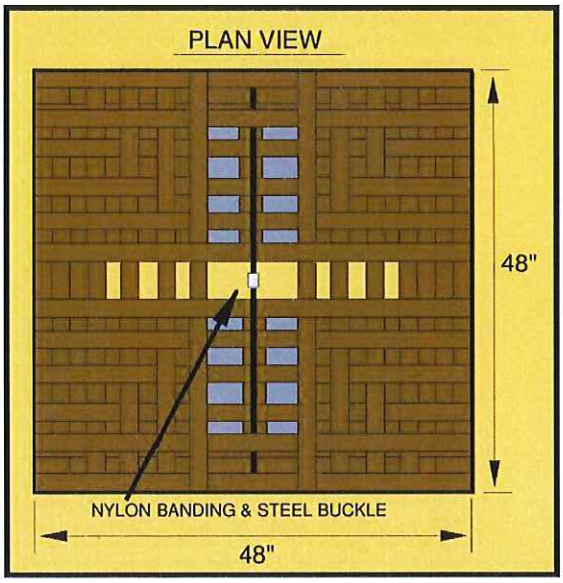
MATERIALS:
ROUGH CUT HEMLOCK LUMBER 2" x 2" x 4'- 50 PIECES
8" x 8" x 16" 2 CORE CONCRETE BLOCKS- 8 TOTAL
16D COMMON NAILS- 2 LBS. (OR 2 STRIPS OF 12D)
1/2" NYLON BANDING- 18'
1 STEEL BUCKLE

NOTES:
LUMBER MUST BE TRUE DIMENSIONAL
LUMBER MUST BE GREEN (FRESH CUT)
YELLOW POPLAR MAY BE SUBSTITUTED FOR HEMLOCK
CONCRETE BLOCKS MINIMUM WEIGHT: 35 LBS
NYLON BANDING: 600 LBS TENSILE STRENGTH
NOT TO SCALE
ALL SIZES ARE APPROXIMATE
FIT IN FIELD

PENNSYLVANIA PORCUPINE CRIB JR. (Houser 2007)







MATERIALS AND NOTES

MATERIALS:
ROUGH CUT HEMLOCK LUMBER 2" x 2" x 4'- 38 PIECES
8" x 8" x 16" 2 CORE CONCRETE BLOCKS- 8 TOTAL
16D COMMON NAILS- 2 LBS. (OR 2 STRIPS OF 12D)
1/2" NYLON BANDING- 18'
1 STEEL BUCKLE

NOTES:
LUMBER MUST BE TRUE DIMENSIONAL
LUMBER MUST BE GREEN (FRESH CUT)
YELLOW POPLAR MAY BE SUBSTITUTED FOR HEMLOCK
CONCRETE BLOCKS MINIMUM WEIGHT: 35 LBS
NYLON BANDING: 600 LBS TENSILE STRENGTH
NOT TO SCALE
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FIT IN FIELD

Porcupine Crib Juniors		**45**	**Cribs**
Materials	Amount	Units	Total Costs
Lumber	3,420	Running feet	$2,394.00
Screws	23	Box	$157.50
Cinder Blocks	180	Individual	$180.00
Strap	600	Feet	$15.30
		Total Cost	**$2,746.80**

Porcupine Cribs		**30**	**Cribs**
Materials	Amount	Units	Total Costs
Lumber	3,060	Running feet	$2,142.00
Screws	30	Box	$210.00
Cinder Blocks	120	Individual	$120.00
Strap	600	Feet	$12.00
		Total Cost	**$2,484.00**

Georgia Cubes		**30**	**Cubes**
Materials	Amount	Units	Costs
PVC Pips	1,200	Feet	$514.80
Screws	30	Box	$164.10
Cable Ties	30	Pack	$186.90
Perforated Tile	3,000	Feet	$1,136.70
PVC Primer	15	Can	$89.70
PVC Cement	15	Can	$89.70
PVC Tee Fittings	240	Individual	$396.00
PVC Elbow Fittings	240	Individual	$243.60
		Total Cost	**$2,821.50**

Black Bass Nesting Structure		**20**	**Structures**
Materials	Amount	Units	Costs
Lumber	2,400	Running feet	$2,480.00
Screws	1,600	Box	$140.00
Cinder Blocks	80	Individual	$80.00
Strap	200	Feet	$40.00
		Total Cost	**$2,704.00**

TOTAL COST:	**$8,272.30**