Cecil M. Harden Reservoir Aquatic Habitat Enhancement Plan

Parke County

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Harden Reservoir, commonly referred to as Raccoon Lake, is a 2,060-acre U.S. Army Corps of Engineers (COE) flood control impoundment located approximately 7 mi east of Rockville, Indiana. The reservoir was constructed between 1956 and 1960 by the COE to provide flood control. The average depth is 24 ft at summer pool but is drawn down 22 ft each fall (Figure 1). Depth contours for the portion of the reservoir exposed during winter draw down was provided by the COE.

Harden Reservoir supports a fish community consisting primarily of Gizzard Shad, Bluegill, Largemouth Bass, White Crappie, and Channel Catfish. The lake is also stocked with Striped Bass.

The lake and adjacent land is co-managed by the COE and DNR Division of Parks and Reservoirs. Because of greatly fluctuating water levels and steep littoral grade, aquatic vegetation, shoreline vegetation (trees and shrubs) and woody debris is very limited during many times of the year. The winter draw down also provides a unique opportunity to place habitat structures because large equipment can be utilized to place structures. 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). Habitat structures that will be used for this project include but are not limited to: 22 felled shoreline trees, 6 cedar brush piles, 100 Pennsylvania Porcupine Cribs, 100 Pennsylvania Porcupine Crib Juniors, 1 stake bed complex, and 7 rock pile complexes (Table 1). Descriptions and building specifications of proposed structures can be found in the Appendix.

This project will focus on the area of the lake south of the State Highway 36 causeway. The average depth of the lake is 24 ft and during summer months oxygen is adequate to around 20 ft. Because of these two factors, the Habitat Enhancement Zone is designated as the area between the 22 ft and 10 ft contour and is about 448 acres or 22% of the lake volume (Figure 2). The proposed structures will enhance approximately 29.2 acres of habitat or 6.5% of the Habitat Enhancement Zone (Clark-Kolaks 2015).

Due to the uncertainty of water levels and favorable conditions structure placement will be conducted over two years during winter drawdown. Structure placement will begin after the lake drawdown begins on October 17, 2016 and is projected to reach winter pool levels by December 1, 2016. While water levels are low and conditions are favorable placement of rock

pile complexes, shoreline tree felling, and brush piles will be begin in the fall and winter of 2016 as conditions provide and then resume in the fall winter of 2017. Construction of cribs will be conducted in 2017 with anticipated placement in the fall and winter of 2017 as conditions allow.

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. Volunteers from Bass Unlimited and other volunteer anglers and COE staff will assist with construction of cribs. Local businesses will be solicited for the donation of materials including: cinder blocks, rock, and lumber. Indiana DNR Public Access staff, COE staff and Indiana DNR Fisheries Biologist will coordinate structure placement. 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 COE. This plan has been reviewed and approved by the Division of Water and Division of Law Enforcement.

LITERATURE CITED

Bassett, C. E. 1994. Use and evaluation of fish habitat structures in lakes of the eastern United States by the USDA Forest Service. Bulletin of Marine Science, 55(2–3): 1137–1148.

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Wagner, E. 2013. Review of fish habitat improvement methods for freshwater reservoirs. Utah Division of Wildlife Resources. http:titiwildlife.utah.govtifestipdftifish_habitat_improvement.pdf.

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Date: August 29 , 2016

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

Table 1. Harden Reservoir proposed habitat structures and associated costs.

Porcupine Crib Juniors (100)

Materials	Amount	Units	Total Costs
Lumber	7,600	Running feet	$5320.00
Screws	50	Box	$350.00
Cinder Blocks	600	Individual	$600.00
Strap	1,700	Feet	$34.00
		Total Cost	**$6,304.00**

Porcupine Cribs (100)

Materials	Amount	Units	Total Costs
Lumber	10,200	Running feet	$7,140.00
Screws	100	Box	$700.00
Cinder Blocks	400	Individual	$800.00
Strap	2,000	Feet	$40.00
		Total Cost	**$8,680.00**

Post Clusters (120)

Materials	Amount	Units	Costs
Posts 6” X 8’	50	Post	$775.50
		Total Cost	**$775.50**

Rock Piles (120)

Materials	Amount	Units	Costs
Rock	140	Tons	$1,540.00
		Total Cost	**$1,540.00**

TOTAL COST: $17,299.50

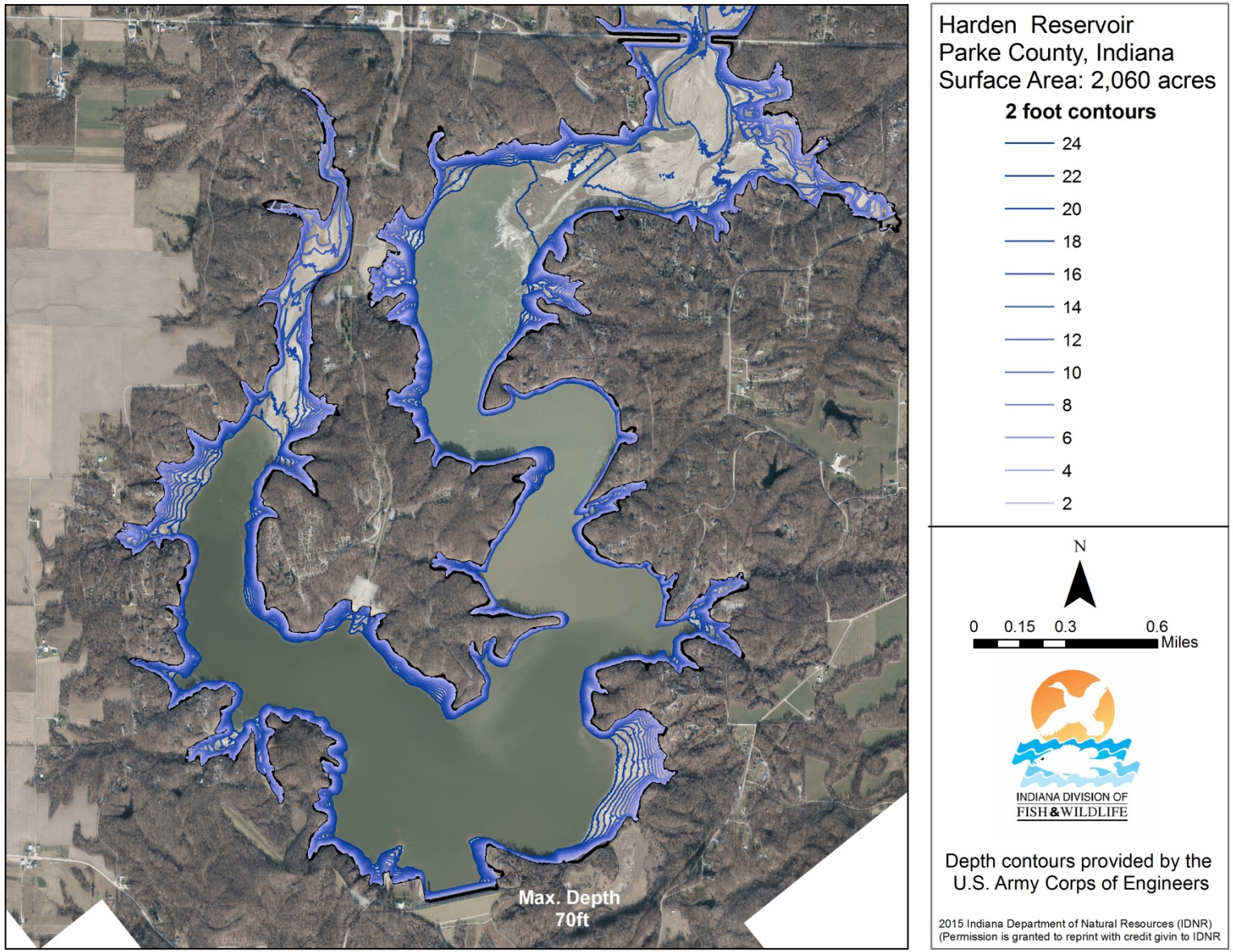


Figure 1. Bathometric map of Harden Reservoir for areas exposed during winter drawdown.

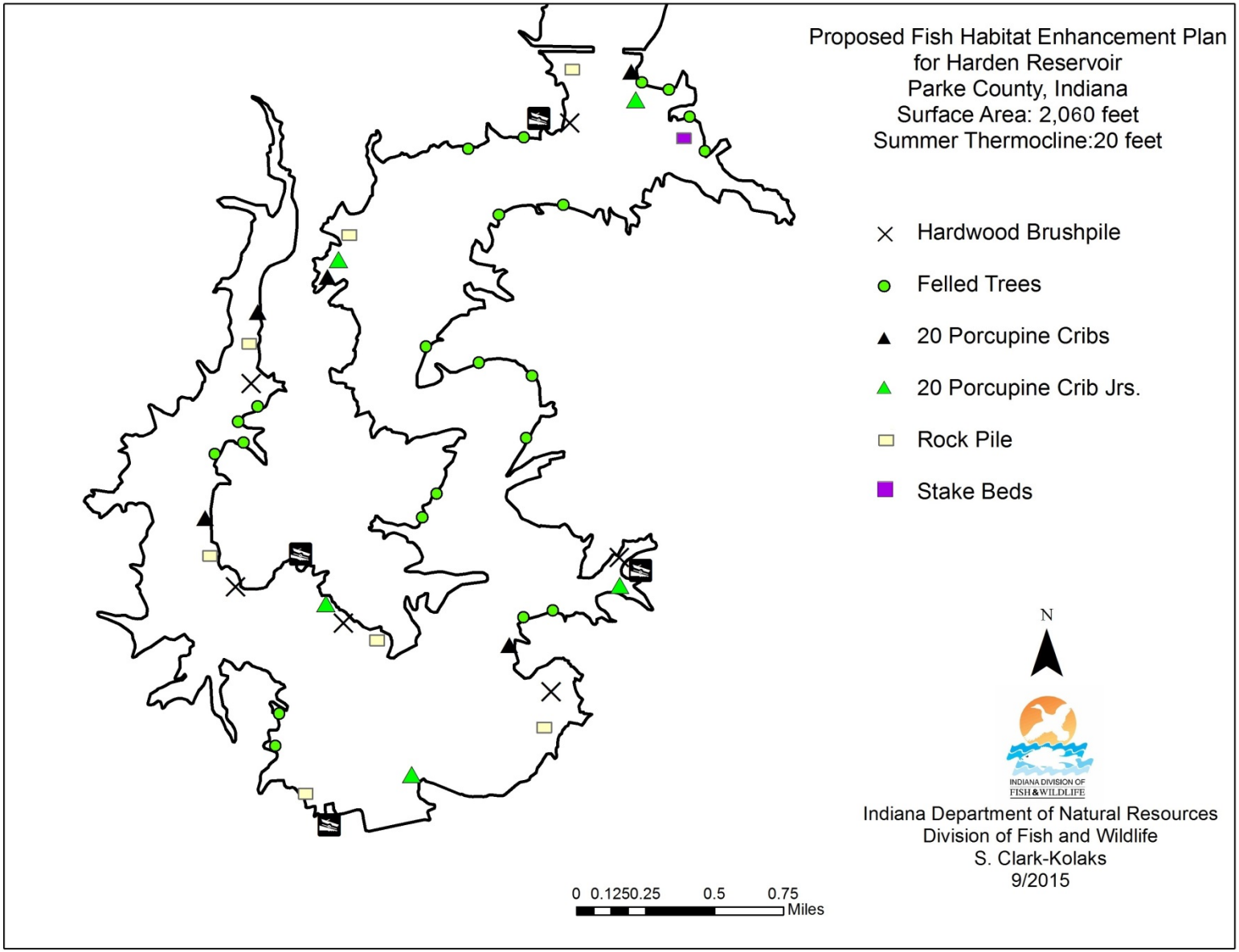
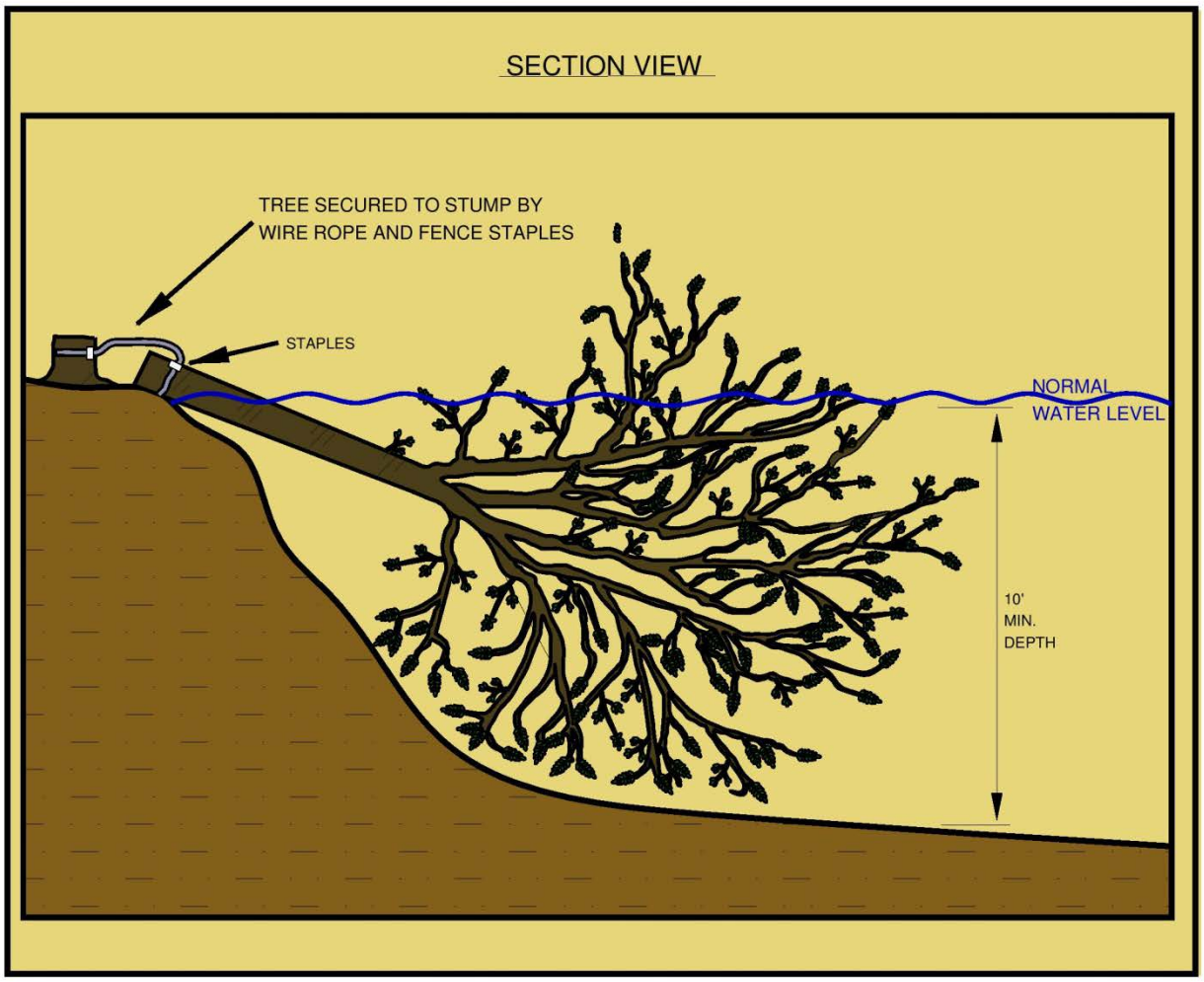


Figure 2. Proposed Fish Habitat Enhancement Plan for Harden Reservoir.

Appendix

Felled Shoreline Trees
Hardwood Brushpile
Pennsylvania Porcupine Crib
Pennsylvania Porcupine Crib Junior
Stake Beds
Rock Piles

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

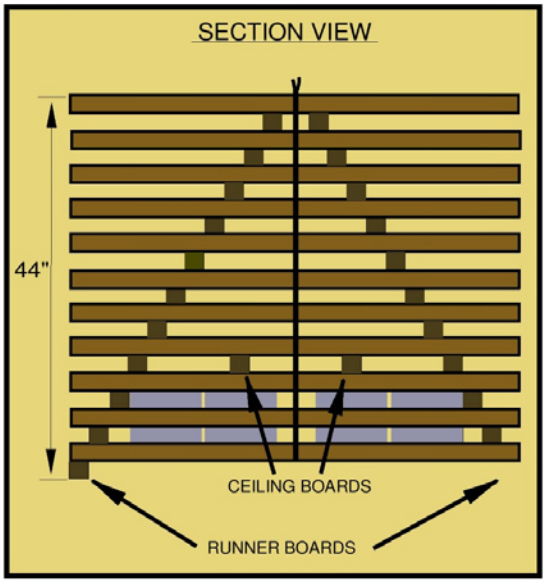
NOTES:

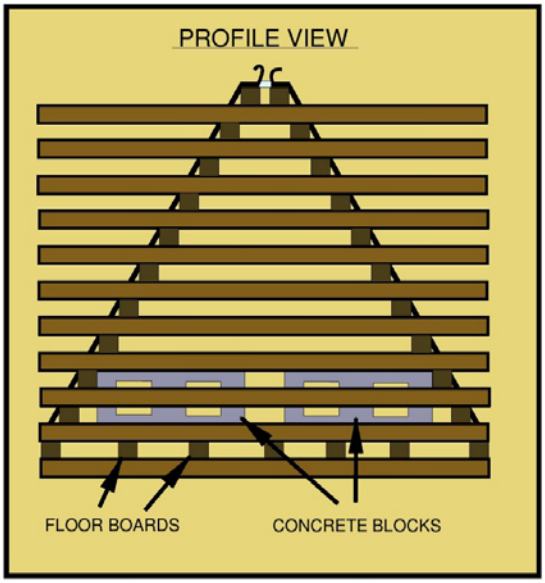
WIRE ROPE AND STAPLES MUST BE USED
TREES SHOULD BE CUT IN SUMMER WHEN THEY HAVE MAX. FOLIAGE
TREE CANOPY SHOULD BE MOSTLY SUBMERGED
TREES SHOULD BE CUT BY PROFESIONALS
AREA MUST BE RESTRICTED TO OTHERS DURING THE CUTTING
NOT TO SCALE
ALL SIZES ARE APPROXIMATE
FIT IN FIELD

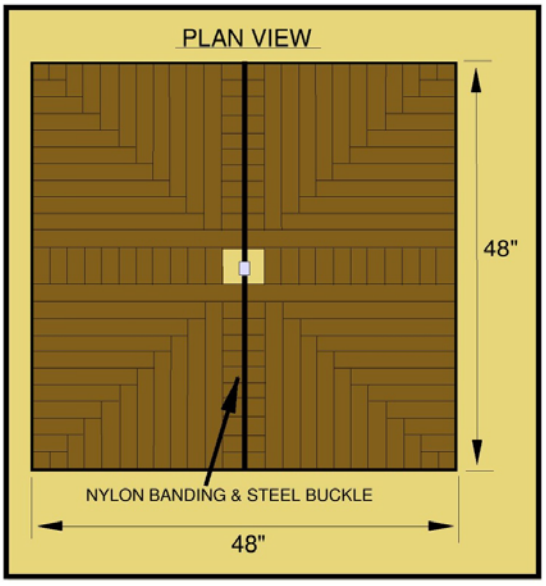
BRUSHPILE

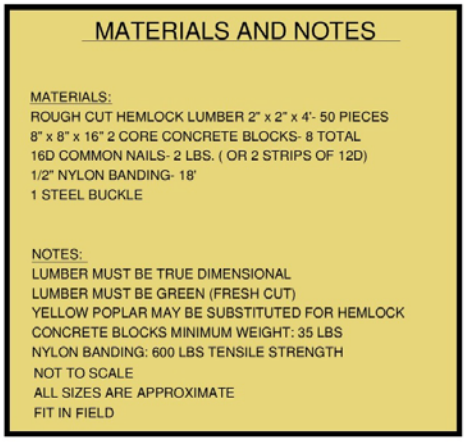
Brush piles can consist of brush, shrubs, branches, or small tree tops bound together with polypropylene rope and weighted with concrete building blocks (Bassett 1994). Trees can be arranged to create artificial structure rows. The rows should be two to three trees wide, with a two-tree space every seven 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 (Bolding et al. 2004).

PENNSYLVANIA PORCUPINE CRIB (Houser 2007)



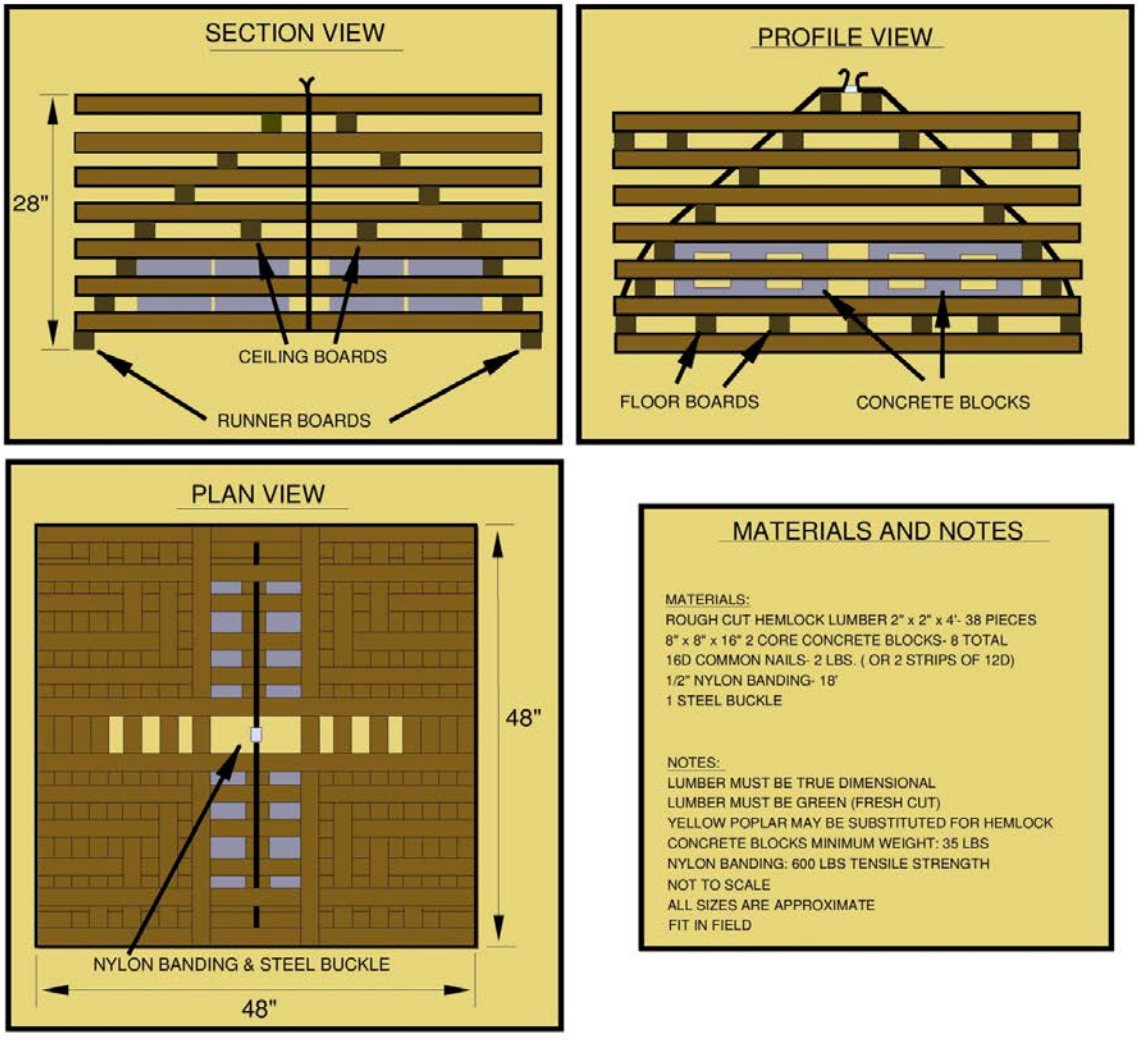






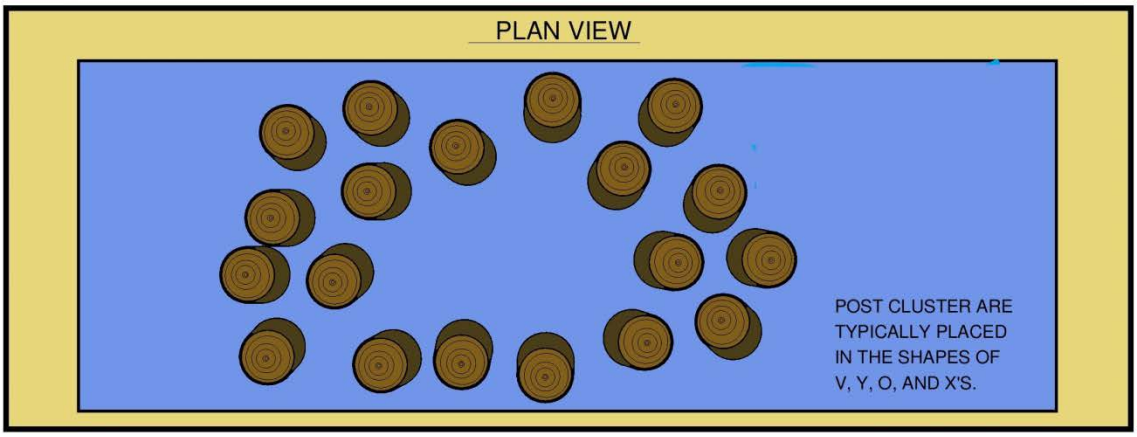
*Six 8 in or eight 6 in concrete blocks per crib.

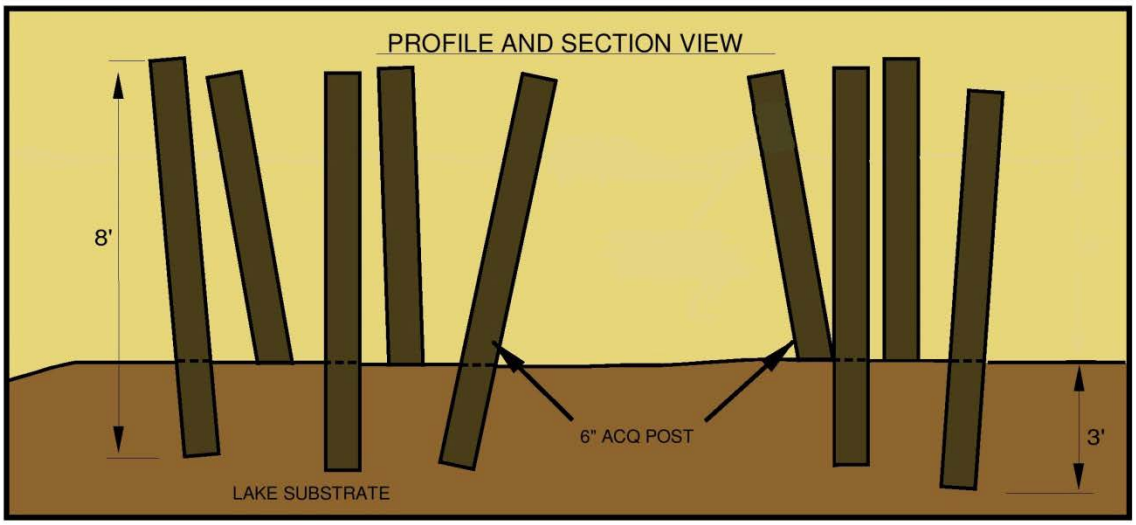
PENNSYLVANIA PORCUPINE CRIB JR. (Houser 2007)



* *Four 8 in or six 6 in concrete blocks per crib.

PENNSYLVANIA POST CLUSTER (Adapted from Houser 2007)





MATERIALS AND SUGGESTED EQUIPMENT

MATERIALS:
ACQ POST 6" X 8' - 1 PIECE

SUGGESTED EQUIPMENT:
EXCAVATOR
SKIDSTEER WITH FORKS
CHAINSAW
OPTIONAL: AUGER BIT FOR THE SKIDSTEER

NOTES

NOTES:
POSTS ARE POUNDED INTO A DRY LAKE BOTTOM
POSTS ARE PLACED USING A EXCAVATOR
25 ACQ POST EQUAL 1 POST CLUSTER
SOME SUBSTRATES MAY NEED TO BE AUGERED
NOT TO SCALE
ALL SIZES ARE APPROXIMATE
FIT IN FIELD

ROCK PILES (Houser 2007)