2009
COOPERATIVE HABITAT IMPROVEMENT PLAN
FOR
BRIAR CREEK LAKE, COLUMBIA COUNTY , PA
COLUMBIA COUNTY CONSERVATION DISTRICT

RESOURCE FIRST
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PLANS BY:
THE PA FISH & BOAT COMMISSION
DIVISION OF HABITAT MANAGEMENT, LAKE SECTION

2009
THREE-YEAR FISH HABITAT MANAGEMENT PROJECT
For
LAKE, COUNTY, PENNSYLVANIA
Sponsored by
COOPERATOR
Plans designed by
THE DIVISION OF HABITAT MANAGEMENT
LAKE SECTION
PENNSYLVANIA FISH AND BOAT COMMISSION
Plans prepared by
Mike Swartz

MANAGEMENT PLAN

The purpose of this plan is to address the habitat needs of **Briar Creek Lake** as they relate to its classification, fish species diversity and abundance, angler use and paid and/or volunteer work force. This plan is being installed at the request of the **Columbia County Conservation District**. This project is aimed at long-term and long-lasting artificial habitats that fit the reservoir's existing native habitats.

This proposed plan will provide the basis for the Cooperative Habitat Improvement Program cooperator, **Columbia County Conservation District,** to place artificial fish habitat structures in **Briar Creek Lake.** Construction supervision, structure placement and design are the responsibility of the Pennsylvania Fish and Boat Commission's (PFBC), **Division of Habitat Management** (**DHM**) and/or its designee. All structures constructed must meet the requirements of the Division of Habitat Management-Lake Section. All structures included in this plan meet the requirements of the Department of Environmental Protection and the U.S. Army Corps of Engineers General Permits (BDWW-GP-1 & SPGP-3).

FINANCIAL ASSISTANCE

Financial assistance is available through the **Division of Habitat Management** (maximum $3000 per project, per calendar year) for the purchase of materials on a 50/50 matching basis with the cooperator. All requests for funding must come from a representative of **Columbia County Conservation District** to the PFBC's Division of Habitat Management. The Cooperator is responsible for all other material and labor costs.

IMPOUNDMENT INVENTORY

Briar Creek Lake is a man-made impoundment, rather than a natural lake. Due to this fact, this impoundment contains native fish habitats (existing physical characteristics), artificial fish habitats (structures or devices placed to act as fish habitat), and natural fish habitats (aquatic vegetation). The native fish habitats in the impoundment combined with the natural topography of the land provide a basis for classification of reservoirs in relationship to habitat. These native habitats existing in **Briar Creek Lake** can be enhanced through the placement of appropriate artificial habitats that best match the reservoir's classification, the native habitats, and the fisheries and angler needs.

Briar Creek Lake was physically surveyed by the Division of Habitat Management- Lake Section on **July 17, 2009** using a Lowrance X515C DF sonar and a Lowrance GlobalMap 5300c iGPS (global positioning system) on a 20' Boston Whaler Outrage utilizing one 90-degree transducer. The survey was conducted to inventory the existing native habitats and classify the impoundment, plus find any existing artificial habitats and determine their usefulness. Any existing artificial habitats found are shown on the attached plan map.

Representatives from Columbia County Conservation District were present and involved in the inventory and the design phase of the plan.

IMPOUNDMENT CLASSIFICATION

Reservoirs like Briar Creek Lake are difficult to classify due to its small size and lack of features. The reservoirs best resembles a Hill-Land classification. The Reservoir has a meandering channel that is well defined. Shoreline points are gradual and rounded. Briar Creek Lake does not have well defined structure like most typical hill-land classified reservoirs. This plan will focus on the hill-land characteristics of the reservoir. (Lalo, Houser 1982, Linder 1987)
(Lalo, Houser 1982) (Linder 1987) (Houser 2007).

ARTIFICIAL HABITATS

Artificial habitats (refuge, spawning, nesting, and nursery) are designed to be effective, long lasting structures aimed at providing habitats that allow fish to accomplish their daily and seasonal tasks with greater efficiency.

Some artificial habitats have dual purposes and may also provide increased opportunities for anglers to catch and/or harvest fish (fish attraction) and/or may provide increased surface areas for algae attachment, aquatic insect colonization and for other food organisms which may increase fishery production (Wege, Anderson 1979) (Nilsen, Larimore 1973) (Benke, et al. 1984). Many of these artificial habitats are also designed to allow fish species to accomplish daily and seasonal survival tasks (performance structures), which may also provide an opportunity to increase productivity within some impoundments.

Fish utilization of habitat (artificial, native or natural) by small fish may be to avoid predation by occupying habitat where predators cannot forage (Glass 1971) (Savino, Stein 1982) or (as predators) to utilize complex habitat as foraging areas (Werner, et al. 1983). Increasing complex habitat may allow coexistence of predators and prey through the creation of an increase of microhabitat types (Crowder, Cooper 1977). Increasing habitat complexity may positively influence predator efficiency by providing small fish with refuge in areas of high structure densities (Hall, Werner 1977) (Werner, et al. 1983).

Complex structural cover may also provide important habitat for aquatic invertebrates (Nilsen, Larimore 1973) (Benke, et al. 1984) and in turn provide foraging opportunities for juvenile and adult panfish that rely on invertebrates as a food source. Complex structure may also serve as habitat for prey resources of black bass (and other predators), thus increasing prey/predator efficiency. Game and panfish also benefit from complex habitat related to the advantages of camouflage (Angermeier, Karr 1984).

Simple structural cover (Bass Nesting Structures, Half-Log structures) (Hoff 1992) can be more effective at providing positive spawning, nesting and parental habitat for black bass, than complex cover (Wills, Bremigan, Hayes 2004). One reason may be, simple cover has less microhabitat types for invertebrates and refuge areas for small fish. Some studies have shown that angler success does not increase during spawning/nesting periods in spawning areas treated with simple artificial cover (Wills, Bremigan, Hayes 2004). Simple structural cover can play a major roll in black bass spawning and nesting success when placed at appropriate sites with suitable substrate (Hoff 1992) (Hunt 2002) (Martin, Phillips 1998).

Some artificial habitat structure designs matched with appropriate native habitats (physical features existing in the impoundment) may be species select or have preferences toward individual size (juvenile vs. adult) and/or fish habits (Prince, Maughan 1979). Artificial habitats known as "forage type structures" are designed to provide basic habitat needs of the impoundment's forage base (baitfish, invertebrates, and crustaceans) (Warnecke, Forbis 1990). In many cases a number of artificial habitat types are required in one reservoir to create habitat diversity (complex and simple/wood and rock/shallow and deep). This creates an opportunity for a more diverse fish community to develop and flourish (Benson, Magnusion 1992).

Complex large wood structure in lakes may create positive fish habitat for a variety of species (Bozek 2001) (Barwick, Kwak 2004). Rough-cut hemlock lumber is used in all the wood structure designs due to its excellent submerged capabilities to create complex artificial fish habitat. In some cases large

hardwood tress are used as large woody structure (Bozek 2001). Other materials used in construction of artificial fish habitats are sandstone, limestone rock, concrete blocks and nails and nylon banding.

All artificial habitats used in this plan have undergone a minimum one-year design phase and two-year durability test. Materials and construction techniques used in the construction of Pennsylvania artificial habitat structures provide the best balance of structure longevity and invertebrate, plankton colonization and fish utilization. Lumber used in the construction of Pennsylvania artificial habitat structures should be green (newly cut), rough-cut true dimensional hemlock or yellow poplar. If other lumber types are required, they will be specified in the plans. All other material types used will be specified in the plan as a specific type of material required for that structure.

PENNSYLVANIA PORCUPINE CRIB

Porcupine Brush Cribs (see attached standard drawings) are long lasting, deep water, complex structures designed as a refuge type habitat. This design should provide juvenile protection and improve recruitment of panfish and gamefish in impoundments that lack abundant, deep-water submerged aquatic vegetation. Construction materials consist of rough cut, true dimensional, green (fresh cut), hemlock or yellow poplar (50 pieces of 2"X 2"X 4'), eight 2 core 8" concrete blocks (min. 36 lbs. ea.) and 2 lbs. of 16d common bright nails (approx. 2 strips of 12d strip nails for nail guns), plus a 14' piece of ½" nylon security banding and one steel buckle.

Placement is traditionally accomplished by specially equipped boats during softwater periods (no ice). Submerged structures are normally placed in a row with 4' to 8' spaces between individual structures. Normally 10 to 20 Porcupines are placed at one site. Structures are submerged in 10' to 15' depths (Lynch, Johnson & Kayle 1988) (Lynch, Johnson, Durfey 1988) along the contour parallel to the shore.

Typically native habitats in hill-land impoundments benefit most from course brush structures (Lalo, Houser 1992). These areas are characterized by steep gradient shores, leading into breaks and/or channels. Steep shores that break onto flats or benches appear to be effective native habitats, when treated with course brush type artificial structures (Lynch, Kayle & Johnson 1988). Typical placement density is 20 structures per acre.

This part of the plan will focus on the hill-land areas and their relationship to panfish and juvenile black bass. **20 Porcupine Cribs** are proposed at **1 site** at an average depth of **12' to 14' (site number: 12-1731)**. All sites are inventoried by way of G.P.S. with each completed structure placement site having its own way-point (Lat/Lon).

PENNSYLVANIA PORCUPINE CRIB JR.

Porcupine Crib Jr. (see attached standard drawings) is an adaptation of the original Porcupine Brush Crib. The original Porcupine Crib was designed as a deep-water structure. The "Jr." is a shallow water version with additional density in the gable ends (see standard drawing). The Porcupine Jr. was designed to mimic the habitat provided by native stumps. Stumps in shallow water provide an important habitat value in Pennsylvania Reservoirs and sometimes are the only true native woody cover in the impoundment.

Typically native habitats in hill-land impoundments benefit most from course brush structures (Lalo, Houser 1992). As impoundments age native stump fields may disappear, due to erosion by wind and/or annual or maintenance drawdowns as the stump fields disappear, so does that particular type of cover (Bozek 2001). In some cases, impoundments do not contain any native stumps, due to the policies in place during impoundment construction. Porcupine Crib Jr.'s should

provide similar cover to pre and post spawning adult panfish and black bass, plus seasonal ambush and security cover for juveniles and adults.

Construction materials consist of rough cut, true dimensional green (fresh cut) hemlock or yellow poplar (38 pieces of 2"X 2"X 4'), eight 2 core 8" concrete blocks (min. 36 lbs. ea.) and 2 lbs. of 16d common bright nails (approx. 2 strips of 12d strip nails for nail guns), plus a 10' piece of ½" nylon security banding and one steel buckle.

Placement is traditionally accomplished by specially equipped boats during soft-water periods (no ice). Normally 10 to 20 Porcupine Crib Jr.'s are placed at one site. The Porcupine Crib Jr. is normally placed in a 5 star fashion with an open center (Bryant, G. L. 1992) on shallow water flats in depths between 6' and 10' (unlike full sized porcupines that is placed in rows near deep water breaks) with varied distances between each individual structure. The Jr. is only 28" high, so even at 6' depths, the structures are not a navigation hazard, except during any drawdown periods where structures may become exposed. This part of the plan will focus on the flats and their relationship to panfish and black bass. **These sites did do not contain any native stumps, but the flat is conductive to structure placement and fish use.** Typical placement density is 30 structures per acre.

20 Porcupine Crib Jr.'s are proposed at **2 sites** at an average depth of **6' to 9' (site numbers: 12-1729, 12-1730)**. All sites are inventoried by way of G.P.S., with each completed structure placement site having its own way-point (Lat/Lon).

ROCK RUBBLE HUMPS

Rock Rubble Humps (see attached standard drawing) provide forage type habitats for a variety of invertebrates, crustaceans and baitfish. Rock Rubble may also benefit various year classes of black bass form young-of-the-year to adult (Jackson, Noble, Irwin, Van Horn 2000).

Rubble humps may also act as fish attractors for walleye, black bass, and panfish. Fish use depends upon location and stone size diversity. Traditionally rubble humps are placed on flats or shoals in flatland or hill-land impoundments. The best method for placement is during maintenance or annual drawdowns with heavy machinery, although the Division of Habitat Management- Lake Section has devised a method to place small rubble humps or spawning substrate by watercraft during softwater periods (no ice). Typical placement density is 20 two-ton humps (40 tons) per acre.

A total of **twenty 1 ton humps** are proposed at **1 site** at approximately **5' to 9' depths (site numbers: 12-1733).** Placement method will be by watercraft**.**

PENNSYLVANIA TURTLE BASKING HABITAT PLATFORM

Pennsylvania Turtle Basking Habitat Platforms were originally designed for Red-Bellied Turtles at Lake Marburg, York County, due to a recent sighting of these rare animals. During the initial evaluation of the basking habitat structures at Lake Marburg, it was soon realized that these basking habitats were utilized by a variety of turtle species, including Red-Bellied Turtles. From this it was then determined that other turtle species could also benefit from artificial basking habitats.

Many Pennsylvania reservoirs contain little, if any, woody debris appropriate for turtles to utilize as basking habitat. This is primarily due to pre-impoundment reservoir clearing and continued debris removal from impounded reservoirs. Without an appropriate basking habitat many turtle species are not able to properly adjust their body temperature. Basking provides opportunities for resting and allows turtles to increase body temperature, which in turn promotes individual growth and aids digestion, reduces susceptibility to disease and improves overall health. Since the Pennsylvania Fish and Boat Commission is responsible for protection and management of turtles in the Commonwealth, the Commission's Division of Habitat Management- Lake Section has designed an artificial basking habitat, in cooperation with Commission's Non-Game & Endangered Species Unit and DCNR/Bureau of State Parks, Codorus State Park.

Sites are normally selected due to past sightings of turtles in that area and if it receives little attention from anglers during softwater periods. This Pennsylvania Turtle Basking Platform is a modified version of the original Codorus design. This design modification is less complicated to construct than the original Codorus design, but provides increased escape possibilities than the original PFBC design. These structures will be constructed with rough-cut true dimensional hemlock or yellow poplar lumber (see attached standard drawing). Placement will be accomplished by specially equipped boats during soft-water periods (no ice). The basking habitat structures will be anchored in place with two 8" X 8" X 16" concrete blocks and 1/4" stainless steel wire rope and placed by specially equipped watercraft in softwater periods (no ice). Typical placement density is 5 structures per acre. A total of **5 Turtle Basking Platforms** are proposed at **1 site** at approximately **2' to 4'** depths **(site numbers: 12-1732)**

STRUCTURE CONSTRUCTION AND PLACEMENT

The construction and placement of all artificial structures in this plan must be coordinated with the **Lake Section** of the **Division of Habitat Management**. Representatives of the **Lake Section** will be on hand to supervise and assist in construction (or a designated representative) of all artificial habitats designed for this project. Specialized PFBC tools and equipment may also be utilized by the cooperator to accomplish construction of artificial structures supervised by Habitat Management Staff. Placement of artificial habitats can, in most cases, be accomplished by specially equipped DHM watercraft, operated by trained **Lake Section** staff. Other state and/or federal watercraft and operators may also be utilized to accomplish projects managed by the Division of Habitat Management. All artificial habitats must be constructed to the specification shown in the standard drawings attached to this plan packet.

PROJECT APPROVAL AND COMPLETION

This project is automatically approved after a fifteen-day review period that begins from the date of the cover letter or memo.

This three-year plan provides the Cooperative Habitat Improvement Program cooperator an opportunity to construct and place a total of **65** artificial habitat structures in **Briar Creek Lake** at an approximate rate of **21** per year. This three-year plan begins in **2009** and is planned for completion by **2011**, unless otherwise extended by a cooperative agreement between **Columbia County Conservation District** and the Pennsylvania Fish and Boat Commission's **Division of Habitat Management** (BSP, 09).

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