2023
FISH HABITAT MANAGEMENT PROJECT
For
F.J. SAYERS LAKE, CENTRE COUNTY, PENNSYLVANIA
Sponsored by
USACE AND DCNR
Plans designed by
THE DIVISION OF HABITAT MANAGEMENT
LAKE SECTION
PENNSYLVANIA FISH AND BOAT COMMISSION
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MANAGEMENT PLAN

The purpose of this plan is to address the habitat needs of F.J. Sayers 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 USACE/DCNR. This project is aimed at long-term and long-lasting artificial habitats that fit the reservoir's existing native habitat features.

This proposed plan will provide the basis for the Cooperative Habitat Improvement Program cooperator, USACE/DCNR , to place artificial fish habitat structures in F.J. Sayers 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's 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-4). Encroachment permitting of this project has been accomplished through the PA Department of Environmental Protection's Water Obstruction and Encroachment Generic Permit No E09-9998 (DCNR/Bureau of State Parks), submitted by the cooperating State Park staff in February 0f 2023**.**

FINANCIAL ASSISTANCE

Financial assistance is available through the Division of Habitat Management Cooperative Habitat Improvement Program (Typically $5,000 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 USACE/DCNR to the PFBC's Division of Habitat Management. The Cooperator is responsible for all other material and labor costs.

IMPOUNDMENT INVENTORY

F.J. Sayers 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 F.J. Sayers 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.

F.J. Sayers Lake was physically surveyed by the Division of Habitat Management's Lake Section on 1/24/23. The survey was conducted to inventory the existing native habitats, classify the impoundment and find any existing artificial habitats. Any existing artificial habitats found are shown on the attached plan map. Personnel from DCNR Bureau of State Parks and USACE were present and involved in the inventory and the design phase of the plan.

ARTIFICIAL HABITATS

Artificial habitats (refuge, spawning, nesting and nursery) are designed to be effective, long lasting structures 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 harvest fish (fish attraction). They can also provide increased surface areas for algae attachment, aquatic insect colonization and other food organisms which may increase fishery production (Wege, Anderson 1979) (Nilsen, Larimore 1973) (Benke, et al. 1984). Many of these artificial habitats are designed to aide multiple fish species in completing various survival tasks (performance structures), which may also provide an opportunity to increase productivity within some impoundments.

Small fish may utilize habitat (artificial, native or natural) 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 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). 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 role 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 trees are used as large woody structure (Bozek 2001). Other materials used in construction of artificial fish habitats are sandstone, limestone rock, concrete blocks, 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 STYLE 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 from 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's Lake Section has a rock rubble barge that can place small rubble humps or spawning substrate by watercraft during softwater periods (no ice). Typical placement density is 20 humps (20 tons) per acre.

A total of Sixteen Hundred 1 to 5 ton humps are proposed at approximately 5' depths. Some rock rubble humps may be converted to Reef balls to add more complexity to rock rubble sites. Placement method will be by heavy machinery. All sites are inventoried by way of G.P.S., with each completed structure placement site having its own way-point (Lat/Lon).

PENNSYLVANIA STYLE ROCK FRAMED DEFLECTORS

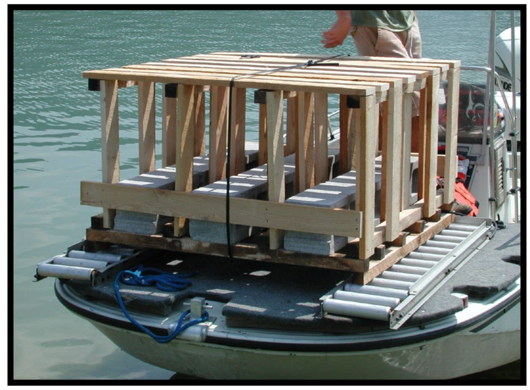
Normally used as a flowing water fish enhancement device (K. Lutz, 2007), rock framed deflectors have been used successfully in numerous PA impoundments as a treatment for shoreline erosion and shoreline aquatic habitat enhancement. Rock deflectors provide armoring to wind/wave eroded shores and manage wave action by deflecting water away from wind driven shorelines.

Rock framed deflectors are constructed from of R-7 (15 to 30 inch stone) size Sandstone Rock which are used to create the exterior frame (10 tons). R-4 (6 to 12 inch stone) size sandstone rock is used as an interior fill (15 tons). Frame rock should be keyed into bank and bottom of the lake. Interior rock should be shingled in place rather than dumped. Root wads can also be incorporated into the rock framed deflector to increase the habitat complexity of the lakeshore.

A total of One hundred and three rock-framed deflectors are proposed at the dam breast site at approximately 2' depths. Placement method will be by heavy equipment.

PENNSYLVANIA SHORT VERTICAL PLANK STRUCTURE

The Short Vertical Plank Structure is designed as a shallow water adult black bass habitat. "Shorty's" are designed for shallow water flats with depths ranging from 5' to 20'. The most effective flats lead into stream of river channels. Shorty's will be placed on these flats in areas void of submerged aquatic vegetation. Shorty's with brush or conifers added to the interior are a beneficial complex habitat. This type of habitat will create excellent overhead cover for ambush or hunt and flush foraging opportunities for adult black bass (Barwick, Kwak 2004). Shorty's should also provide outstanding early season adult panfish cover when course brush is added to the structure (Barwick, Kwak 2004).



Vertical wooded and course brush structures have been found successful in attracting fish in shallow water (less than 10') in hill-land and highland impoundments. The most effective placement appears to be in dense circles of structures with one or more openings in the center (Bryant 1992) or in an irregular line formation with large openings between individual devices (see standard placement drawing). Largemouth bass, sunfish, crappie and yellow perch favor coarse brush and wooden type structures when placed on or near steep gradient shores that break onto flats or benches (Lynch, Kayle & Johnson 1988).

Construction materials consist of rough-cut, true dimensional green (fresh cut) hemlock or poplar (32 pieces of 1" X 4" X 24", 10 pieces of 1" X 4" X 48" and 35 pieces of 2"X 2"X 48"), nine 2-core 8" concrete blocks (min. 36 lbs. ea.) and ½ lb. of 16d common bright nails (approx. 1 strip of 12d strip nails for nail guns) and 2 lbs of 8 d common bright nails (approx. 2 strips of 2 5/8" strip nails for nail guns) plus a 10' piece of ½" nylon security banding and one steel buckle (see standard drawing).

The Short Vertical Plank Structure is 29" high, so it can be placed in depths between 5' and 10' and still is safe from boating traffic (they may create a navigation hazard during draw-down periods where structures may become exposed). Placement is accomplished by specially equipped boats during soft-water periods (no ice). This part of the plan will focus on sites that have shallow water near shoreline and offshore flats. Typical placement density is 30 structures per acre. A total of 300 structures are proposed at multiple sites at approximately 4'-5' and 30'-35' depths. All sites are inventoried by way of G.P.S., with each completed structure placement site having its own way-point (Lat/Lon).

PENNSYLVANIA CHANNEL CATFISH SPAWNING BOX

Channel Catfish Spawning Boxes (see attached standard drawing) are a tool that can be used to propagate white catfish and channel catfish in impoundments. For natural reproduction to occur, adults require a hollow object to enter, spawn and provide nursery protection to the young-of-the-year. These objects must have dark interiors and/or be well shaded. Also the habitat must have only one entrance (Busch 1983). Natural spawning habitats come in many forms, such as hollow logs, bank beaver or muskrat holes, rock crevices and deeply undercut shores. Due to reservoir clearing, little if any native spawning habitat occurs in *F.J. Sayes Lake*. PFBC Division of Fisheries Management surveys show no natural reproduction is currently occurring.

A total of 180 channel catfish spawning boxes are proposed at multiple sites throughout the lake at approximately 3' to 5' that have native catfish habitat suitable for treatment with artificial spawning habitats. Typical placement density is 10 structures per acre. All sites are inventoried by way of G.P.S., with each completed structure placement site having its own way-point (Lat/Lon).

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 (or a designated representative) will be on hand to supervise and assist in construction 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. 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.

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