

# PUBLIC NOTICE



US ARMY CORPS  
OF ENGINEERS  
OMAHA DISTRICT

APPLICANT: SD GAME, FISH & PARKS  
APPLICATION NO: NWO-1991-75996-PIE  
WATERWAY: Ponds, Lakes and Reservoirs  
within South Dakota  
ISSUE DATE: February 7, 2013  
EXPIRATION DATE: March 9, 2013

Regulatory Office, 28563 Powerhouse Rd, Room 118, Pierre, SD 57501  
<http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/SouthDakota.aspx>

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**30-DAY NOTICE**

## JOINT NOTICE OF PERMIT PENDING

US ARMY CORPS OF ENGINEERS  
AND  
SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

The Corps of Engineers, Omaha District, proposes to re-issue Regional General Permit 91-04 for the South Dakota Department of Game, Fish and Parks construction of artificial reefs and spawning beds in ponds, lakes and reservoirs within the State of South Dakota. In accordance with 33 CFR § 325.2(e)(2) and 33 CFR § 325.5(c), the District Engineer is authorized to use an alternative procedure for evaluating permit applications for categories of activities that are substantially similar and will cause only minimal individual or cumulative impacts. This alternative procedure avoids unnecessary duplication of regulatory control exercised by other government agencies. The District Engineer, Omaha District, proposes to re-issue this regional general permit for a period of five (5) years. No changes to the existing permit are proposed.

Before any project will be considered under this activity category, it must conform to the Detailed Description of Authorized Work, proposed Special Conditions, and the general criteria listed in Appendix A and B described in this public

notice. Typical drawings of the artificial reefs and spawning beds are also attached.

The project locations include all ponds, lakes and reservoirs within the state of South Dakota.

The South Dakota Department of Environment and Natural Resources, Division of Environmental Regulation, 523 East Capitol Avenue, Pierre, South Dakota, 57501-3181, will review the proposed General Permit for state certification in accordance with the provisions of Section 401 of the Clean Water Act. The certification, if issued, will express the State's opinion that the operations undertaken by the applicant will not result in a violation of applicable water quality standards. The South Dakota Department of Environment and Natural Resources hereby incorporates this public notice as its own public notice and procedures by reference (ARSD 74:03:02).

The decision whether to re-issue a General Permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonable may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the activity will be considered, including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production, and, in general, the needs and welfare of the people. In addition, the evaluation of the impacts of this General Permit on the public interest will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency, under authority of Section 404(b) of the Clean Water Act (40 CFR Section 230).

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials, Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition, or deny a General Permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an environmental assessment and/or an environmental impact statement pursuant to the National Environmental Policy Act. Comments are

also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this General Permit. Requests for public hearings shall state, with particularity, the reason for holding a public hearing. The request must be submitted to the **US Army Corps of Engineers, South Dakota Regulatory Office, 28563 Powerhouse Road, Room 118, Pierre, South Dakota 57501.**

Any interested party (particularly officials of any town, city, county, state, or federal agency, or local association whose interests may be affected by this proposed General Permit) is invited to submit to this office, written facts, arguments, or objections on or before the expiration date of this notice. Any agency or individual having an objection to the proposed General Permit should specifically identify it as an objection with clear and specific reasons. Comments, both favorable and unfavorable, will be accepted, made a part of the record and will receive full consideration in subsequent actions on this permit application. All replies to the public notice should be addressed to the address listed in the previous paragraph. **Matthew Sailor**, telephone number **(605) 224-8531**, may be contacted for additional information.

Comments received after the close of the business day on the expiration date of this public notice will not be considered.

## DESCRIPTION OF AUTHORIZED WORK

General - Artificial reefs have been used for several decades in efforts to enhance fish habitat and angling opportunities. As a management tool, particularly in bodies of water like South Dakota's glacial lakes, reservoirs and stock ponds that lack natural cover and structure, artificial reefs provide substrate for food organisms (e.g. invertebrates), escape cover and forage for juvenile and adult fish, ambush cover for predator species in some cases, and spawning habitat. The following artificial reef structures will be used to meet these enhancement goals.

Tire Reefs (figure 1) - Tire reefs can be placed or constructed in a variety of ways including: a) single tire units; b) three tire triangular units; c) various configurations of nine (9) tire units; d) six tire chain units; e) five (5) tire structures; and, f) high profile tire structures. Other multiple tire units may be constructed if management goals warrant larger structures. Each tire will be weighted with concrete. Tire reefs will be secured together by cable or polypropylene rope. Holes drilled in the top of each tire will allow air to escape. Tire structures will typically be placed with boats.

Woody Plant Reefs (Figure 2) - Woody plant reefs will be constructed of discarded Christmas trees and/or similar brushy plant/tree material. If multiple tree units are used, several trees will be secured together at the base with polypropylene rope. Each tree unit (single or multiple tree) will be securely anchored using concrete weights. These structures will be placed with boats or in some cases on the ice where ice drift potential is low.

Rock/Gravel/Concrete Rubble Reefs (Figure 3) - Most rock and gravel reefs will be designed to provide natural spawning substrate of game fish species such as walleyes, bass and other species that spawn over these types of substrates. Rock reefs with very large rock also provide important hiding cover for predator species, as well as habitat for prey such as crayfish and forage fish. Rock reefs will also provide additional structure to enhance angling opportunities.

Depending on site conditions, enhancement goals and materials available, reefs will be constructed using a variety of sizes of rock, gravel or clean concrete rubble and may be placed as a deeper water structure or in shallow shoreline areas to enhance spawning habitat. Materials susceptible to erosion by waves and/or wind (if exposed during extreme low water conditions) will not be used for reef construction. Material size will vary from approximately one (1) inch gravel to three (3) foot diameter boulders or clean concrete rubble. Material size selection will

be based on enhancement goals and target species. Layering of gravel and rock or concrete rubble will provide a more diverse mix of large crevice habitat and gravel spawning sites. Typically a gravel layer may be used as the top layer.

Depending on site conditions and enhancement goals reefs may vary in size and shape and depth of placement. Figure 3 depicts types of rock reefs including: a) large straight and sinuous reefs approximately fifty (50) feet wide and three hundred (300) or more feet long; b) smaller rectangular or square reef (e.g., twenty (20) feet by twenty (20) feet by five (5) feet high); c) shallow water spawning reefs; and d) small and large rock rubble reefs. Typically, reef height will not exceed five (5) feet. Final reef design and dimensions will be provided on a case by case basis. Deeper water reefs will be constructed such that they will typically be covered by at least five (5) feet of water to avoid creating hazards for boaters.

In some cases, particularly in reservoirs with fluctuating water levels, or when enhancement goals calls for shallow water structure and/or spawning substrate, reefs may be placed in shallower water. In the former case, shallow placement will ensure that the structures still provide habitat value during high water conditions. Clean rock and gravel may also be placed immediately adjacent and parallel to the shoreline to provide habitat for shallow water spawning. Larger rock will be placed along the shoreline and above the spawning substrate to protect it from siltation due to wave induced shoreline erosion. The large rock will also provide habitat for juvenile fish and prey species such as crayfish and other invertebrates. Larger rock and cobble also provides spawning habitat for some game species such as walleyes. Basically, the form and function of these types of structures is similar to the submerged rock reefs discussed above, except these structures will be utilized where the improvement of shallow water spawning habitat is necessary to meet fishery management goals.

In shallow water spawning habitat applications, rock and gravel will typically be layered to provide a diverse mix of habitat types and will extend along the existing bottom approximately five (5) to fifteen (15) feet from the shore depending on site conditions and water depths. Rock and gravel will be sized according to erosion protection needs and spawning substrate requirements of target species. Intensity of potential wave action and ice damage will be considered during the planning of the project and the selection of rock size to be placed using standard backhoe or loader riprap placement techniques.

All rock reefs will be placed in a manner to minimize hazards to boaters. Marking of some reef sites may be necessary if shallow

water hazards exist. Fluctuating water levels may result in the occasional exposure of, or shallow water conditions over shallow water reefs. Under such conditions these structures should not pose and greater hazard to boaters than normal shallow water shoreline conditions.

During low water conditions in reservoirs, reef materials will be placed by end dumping in place. Rock reefs may also be constructed by placing rock and gravel materials on the ice and letting it settle into place during the spring thaw.

Stake Bed Reefs (Figure 4) - Stake bed reefs consisting of wooden stakes attached to a wooden frame will be constructed as shown in Figure 4. Stakes will typically consist of one (1) by two (2) inch stock, and will vary in length and will be nailed to a four (4) by eight (8) foot wooden frame (frame size may vary depending of site conditions and enhancement goals). Each reef will be anchored to the lake bottom with concrete weights. Stake bed reefs will be placed using boats.

Hollow PVC Pipe Bed Reefs (Similar to Figure 4) - PVC pipe bed reefs will be constructed in a similar fashion to wooden stake bed reefs discussed above. Two (2) to four (4) inch diameter PVC pipe of various lengths will be attached to a PVC frame. Each PVC reef will be anchored to the lake bottom using concrete weights.

Spawning Boxes (Figure 5) - Wooden spawning boxes are designed to provide additional spawning sites for bass. These boxes will be approximately three (3) feet by five (5) feet by eight (8) inches deep with a screen or wire mesh bottom. A three (3) inch bed of one-half (1/2) inch gravel in the box provides spawning substrate for bass. Boxes will be placed in two (2) to five (5) feet of water along lake shores.

Pipe Structures (Figure 6) - Vitrified clay, concrete, PVC, and corrugated polyethylene piping can be bundled in a pyramid shape and placed to provide needed habitat for catfish and bullheads. Plastic bundling strips or polypropylene rope will be used to construct the bundles. It is necessary to weight or ballast the PVC and plastic bundles with concrete plugs in the ends of four (4) of the pipes (see figure) or by filling the bottom center pipe with concrete. Additional ballast for clay or concrete pipe unities is not necessary. Larger pipe may be used to construct single pipe structures. These structures will be placed with boats.

Plastic Snow Fence Structures (Figure 7) - High-density polyethylene snow fence may be used in a couple of configurations to provide excellent escape cover for juvenile fish, particularly bass, crappie and panfish. The two (2) configurations include:

a) vertically oriented fish "condos", and b) horizontal "bass bungalows" which will be constructed as shown in figure 7. These structures will be placed with boats.

Anchored Trees (Figure 8) - Large trees placed singularly or in small groups will be anchored securely to shore above normal high water and to the lakebed to prevent drifting. Trees will be anchored with driven or deadman posts, or if feasible, to an existing stump or nearby tree. The tree(s) will extend along the bottom into eight (8) to ten (10) feet of water and will provide much needed structural diversity along lake shores similar to that provided by natural tree snags. Tree structures will provide spawning areas for forage fish such as fathead minnows, loafing areas and escape cover for juvenile and adult fish and will improve angling opportunities.

Log or Lumber Crib Structures (Figure 9) - Crib structures may be constructed in a variety of configurations using logs or lumber such as 2x2's. Log cribs are typically fastened together using rebar at the structure corners. Lumber cribs are simply nailed together. These wooden structures are weighted with concrete blocks or rock and submerged in water 10 to 15 feet deep. The interior area of cribs provide cover for juvenile and forage fishes while the vertical sides or gable ends on the exterior provide ambush cover for predator species such as largemouth bass and panfish.

Pallet Structures (Figure 10) - Pallet structures are constructed of surplus wooden shipping pallets in a variety of configurations including triangular and box shapes. In both types, pallets are oriented vertically. The pallets can be nailed directly together to form a triangle or spaced and attached along lumber stringers to form a vertical box-like structure. These structures are weighted with concrete blocks. Like the cribs discussed above, pallet structures provide enhanced hiding and ambush cover for a variety of fishes.

Half Log or Plank Cover Structures (Figure 11) - Half log or plank cover structures are constructed using logs sawed length-wise or lumber 8 to 12 inches wide and 9 to 10 feet long attached to and suspended above the bottom with masonry blocks to submerge the plank. Softwood lumber may require more than two blocks to submerge the plank. These plank structures provide important hiding cover for bottom spawning fishes such as smallmouth bass which prefer to spawn near areas with good overhead cover such as fallen trees or very large boulders. Male smallmouth use such cover while they protect a nest.

**General Permit 91-04,  
Amendment No. 4  
Special Conditions:**

- a. All construction debris will be disposed of on land in such a manner that it cannot enter a waterway or wetland.
- b. Equipment for handling and conveying materials during construction shall be operated to prevent dumping or spilling the materials into the water except as approved herein.
- c. During construction no petroleum products, chemicals, or other deleterious materials shall be allowed to enter or be disposed of in such a manner that they could enter the water and that precautions be taken to prevent entry of these materials into the water.
- d. All work in the waterway is performed in such a manner so as to minimize increases in suspended solids and turbidity which may degrade water quality and damage aquatic life outside the immediate area of operation.
- e. Only clean riprap materials will be utilized in order to avoid the percolation of fines which would result in excessive local turbidity.
- f. The clearing of vegetation will be limited to that which is absolutely necessary for construction of the project.
- g. All areas along the bank disturbed or newly created by the construction activity will be seeded with native vegetation (both herbaceous and woody species) indigenous to the area for protection against subsequent erosion and to minimize adverse impacts to fish and wildlife resources. This may require maintenance such as reseeding, watering, implementation of grazing restrictions, fencing, etc., to ensure the survival of the replacement vegetation.
- h. All earthwork operations on shore will be carried out in a such a manner that sediment runoff and soil erosion to the water are controlled.
- i. If/when the District Engineer has been notified that the activity is adversely affecting fish or wildlife resources or the harvest thereof and the District Engineer subsequently directs remedial measures, the permittee will comply with such directions as may be received to suspend or modify the activity to the extent necessary to mitigate or eliminate the adverse effect as required.



j. The United States shall not be responsible for damage to property or injuries to persons which may arise from or be incident to the work herein authorized, and the permittee shall hold the United States harmless from any and all such claims, except to the extent that the damage or injury is caused solely by the negligence of the United States.

k. All materials used to construct a reef or spawning bed will be nontoxic, nonhazardous and free of any non-native seeds, vegetation or egg deposits. Chemically treated trees and other preservative treated wood materials shall not be introduced into any water resource.

l. All reefs will be preconstructed on the bank, if possible, and moved to their locations while the lake is frozen or put in place from a boat.

m. All reefs will be constructed and located so that the highest point on the reef or spawning bed is a minimum of five (5) feet below the average annual low-water elevation of the waterbody involved. If such a five (5) foot buffer is not attainable due to the specific fishery enhancement goal, the reef or spawning bed shall be clearly marked as a navigation hazard and the agency responsible for operation and maintenance of the waterbody where the structure is to be placed shall be notified prior to project implementation. An exception will be for "shallow rock and/or gravel reefs along shorelines".

n. All reefs and spawning beds will be located so as not to conflict with major boating channels, landing areas, or designated swimming zones.

o. All machinery shall be fueled and maintained at a site where fuels, lubricants, and other deleterious substances cannot enter the waterway. Equipment used in construction shall be thoroughly cleaned at the prior job site in a manner that ensures all residual soil is removed and that seeds, vegetation, or egg deposits from plants/pests are not present to prevent the introduction of non-native flora and fauna to the waterway and surrounding area.

p. All structure components shall be secured together in a manner and with materials which will insure their integrity.

q. All materials originally manufactured and used for other purposes shall be inspected for presence of substances such as oils, grease, or other deleterious materials, and such substances shall be removed prior to use in any waters of the United States.

r. If broken concrete rubble is used, it will be cleaned of any deleterious materials (i.e., asphalt, rebar, wire mesh, etc.) prior to its placement in the waterway.

s. The discharge will consist of suitable material free from toxic pollutants, in toxic amounts.

t. The fill created by the discharge will be properly maintained to prevent erosion and other non-point source or pollution.

u. The use of creosote and/or PCB treated wood and wood products (to include, but not limited to, crossties, power poles, telephone poles, wood fence posts, wooden crates and bridge timbers), man-made products, or natural products constructed with or treated with chemicals that may degrade water quality, harm fisheries, wildlife and/or their habitat are not authorized for use under this general permit.

v. The construction of any artificial reef or spawning bed authorized under the provisions of this General Permit must be started within one year of such authorization and must be completed within three years, or said authorization, if not previously revoked or specifically extended, shall automatically expire.

**General Permit 91-04,  
Amendment No. 4  
Appendix A**

The following will govern the duration, utilization and applicability of this general permit:

1. The cumulative impacts of this general permit may be subject to reevaluation at the discretion of the District Engineer at any time, but will be reevaluated at the end of the five (5) years.
2. Any proposed project, which is located in an area containing historic, cultural, or archeological sites as listed in the National Register of Historic Places, or those known to be eligible for such listing, and all monthly supplements thereto; and any proposed project, which is located in a site included in the National Registry of Natural Landmarks, will not be considered (authorized) under this general permit.
3. Any proposed project located in an area named in Acts of Congress or Presidential Proclamations as National Rivers, National Wilderness Areas, National Recreation Areas, National Lakeshores, National Parks, National Monuments, and such areas as may be established under Federal law for similar and related purposes, such as estuarine and marine sanctuaries, will not be considered (authorized) under this general permit.
4. Sites where the activity would result in adverse impacts to Federally or state listed threatened and/or endangered species or their critical habitat will not be considered (authorized) under this general permit. The project must comply with the Endangered Species Act.

**General Permit 91-04,  
Amendment No. 4  
Appendix B**

1. The permittee will provide the US Army Corps of Engineers, South Dakota Regulatory Office, 28563 Powerhouse Road, Room 118, Pierre, South Dakota 57501, notification and project information prior to the start of construction and/or placement of any artificial reef or spawning bed. The following information will be required at a minimum:

a. Legal description (section, township, range) and a vicinity map with the exact location of all structures clearly marked.

b. A written description of the work including: the purpose and need, type and number of artificial reefs or spawning beds, dimensions with plan and cross-sectional views of the structure(s), equipment to be used, and any other pertinent, supporting data.

c. If applicable, any wetlands impacted by the proposed activities shall be identified and the impacts described.

No project may proceed until notification of approval has been received from the Corps of Engineers that the proposal meets the General Permit criteria.

2. If the project is to be located in any of the Missouri River reservoirs, a Notice of Intent to construct a particular project, clearly describing the location and nature of the proposed work, will be provided to the appropriate Corps of Engineers Operations Manager in advance of the project implementation:

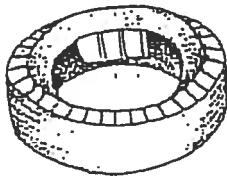
Gavins Point Project - Operations Manager, P.O. Box 710,  
Yankton, South Dakota 57078.

Fort Randall Project - Operations Manager, 113 Randall Creek  
Road, Pickstown, South Dakota 57367.

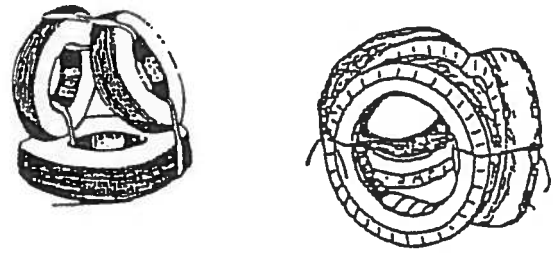
Big Bend Project (Big Bend Dam to Antelope Creek) -  
Operations Manager, 33573 North Shore Road, Chamberlain,  
South Dakota 57325.

Oahe Project (Antelope Creek to North Dakota State Line) -  
Operations Manager, 28563 Powerhouse Road, Pierre, South  
Dakota 57501.

TIRE REEFS (FIGURE 1)

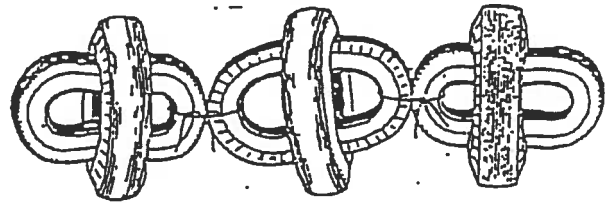
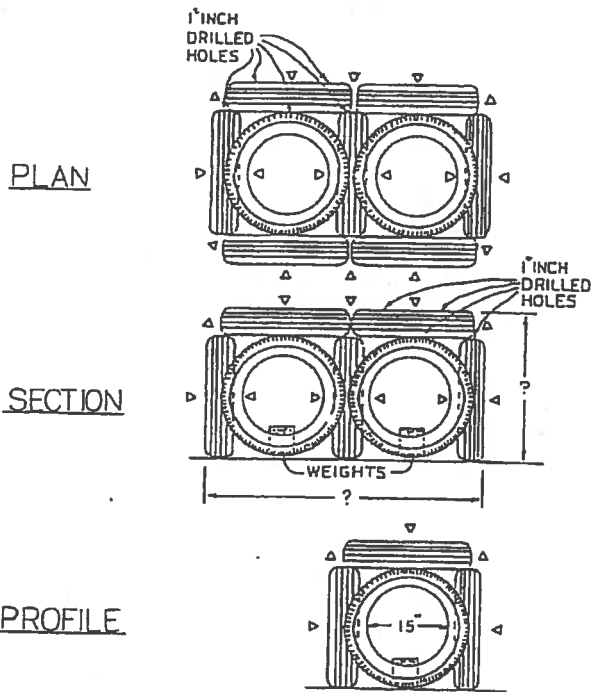


a. Single Tire Unit



b. Three Tire Units

NINE TIRE, TIRE STRUCTURE



d. Six Tire Chains

- MATERIALS:  
 9-15 TIRES  
 50'-1/2" NYLON BANDING  
 1 2-1/2" PLASTIC BUCKLES
- LEGEND:  
 ◀ - BANDING POINT

c. Nine Tire Configurations

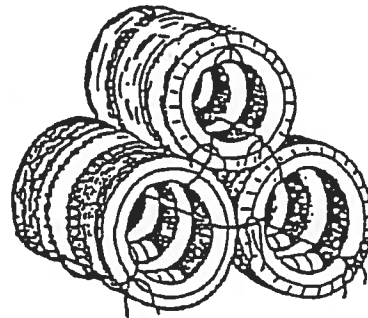
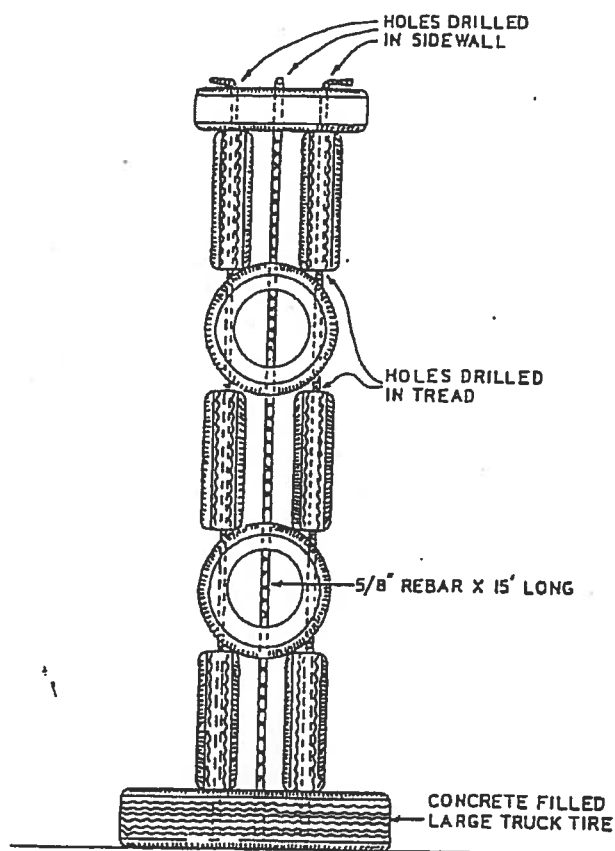


FIGURE 1  
 TIRE REEFS

e. Five Tire Structures

(no drawing available, but similar to rectangular nine tire unit, but w/ 5 tires)

TALL TIRE STRUCTURE



f. High Profile Structures

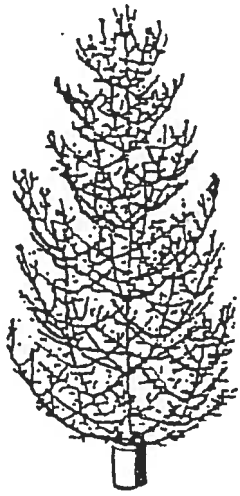
FIGURE 1  
TIRE REEFS  
(continued)

Artificial Reefs/Spawning Beds

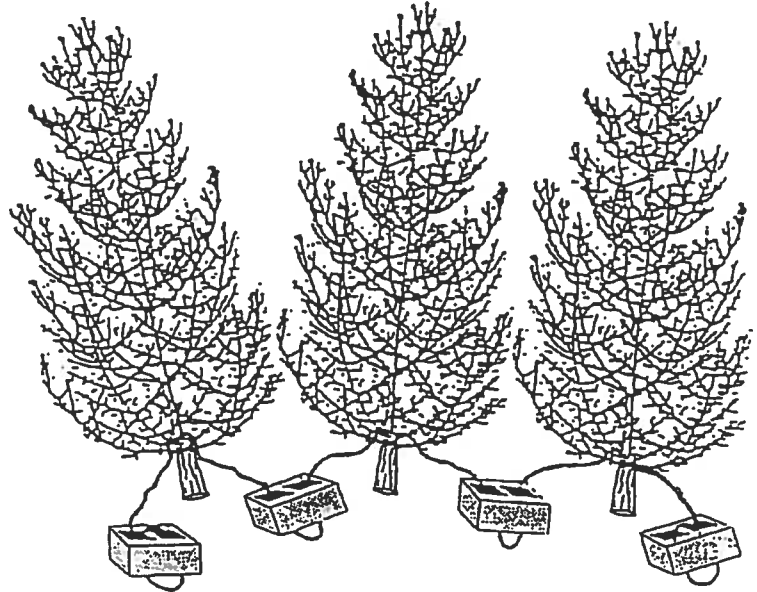
GP 91-04, Amendment No. 4

Ponds, lakes and reservoirs  
within South Dakota

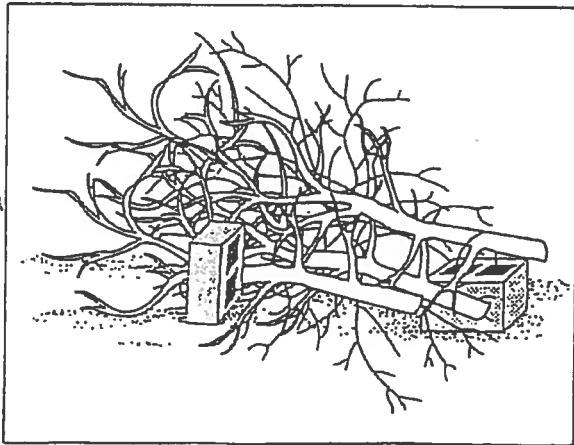
WOOD PLANT REEFS (FIGURE 2)



Single Weighted  
Christmas Trees



Multiple Christmas  
Tree Bundles



Anchored brush piles

Bundle sizes will vary  
depending on enhancement  
needs

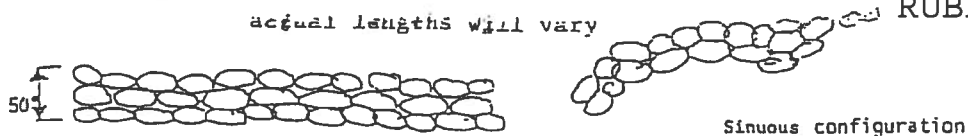
FIGURE 2  
WOODY PLANT REEFS

Artificial Reefs/Spawning Beds

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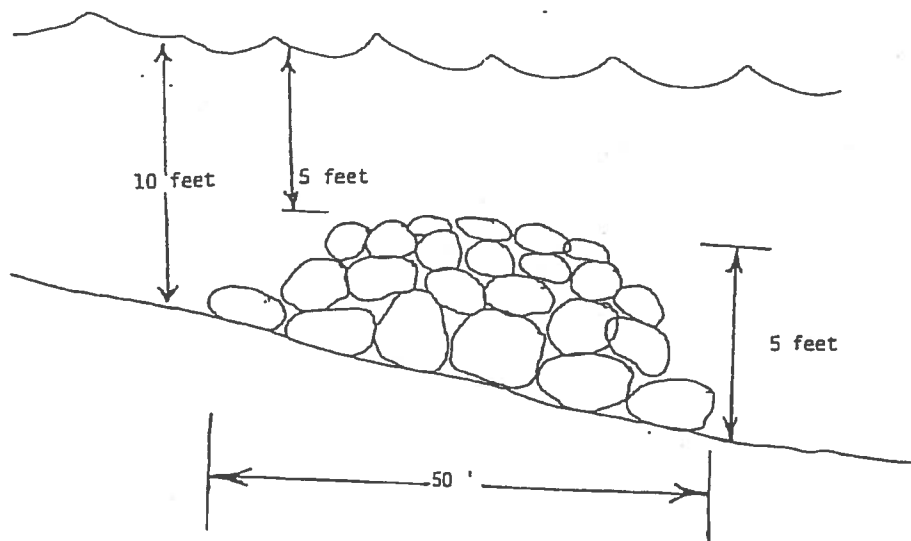
ROCK/GRAVEL/CONCRETE  
RUBBLE REEFS (FIGURE 3)



Straight line configuration

Large-scale  
linear and sinuous  
rock and gravel  
reefs

TOP VIEW



SIDE VIEW

Small-scale square  
or rectangular rock  
and gravel reef

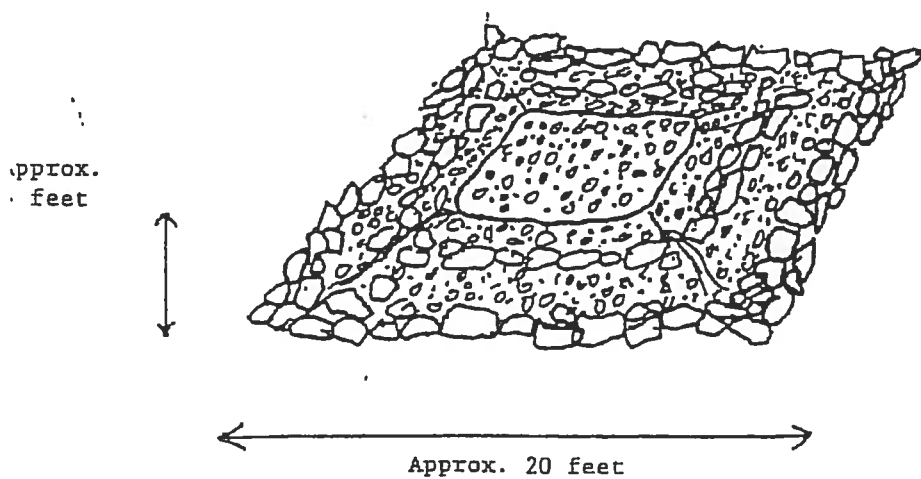
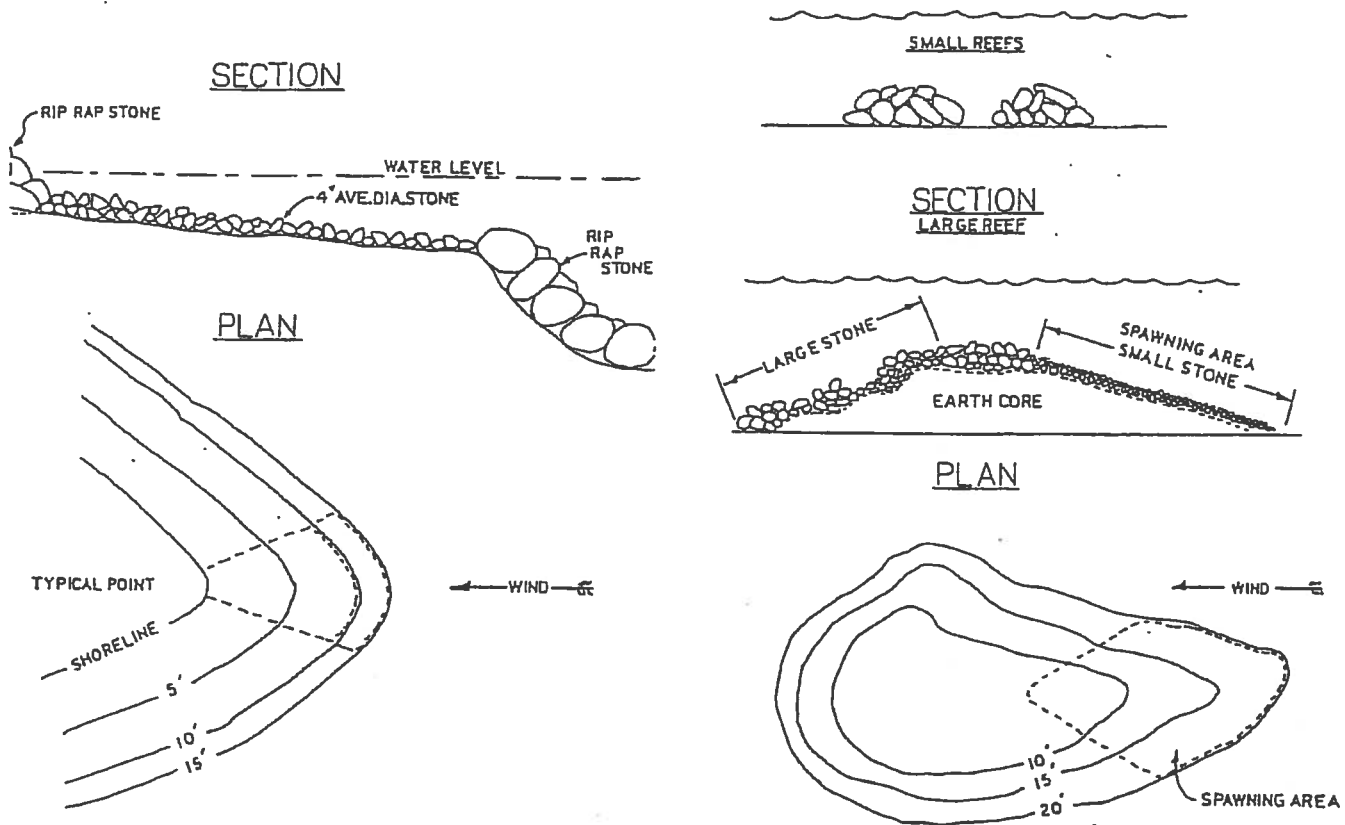


FIGURE 3  
ROCK, GRAVEL AND CONCRETE RUBBLE REEFS

Artificial Reefs/Spawning Beds

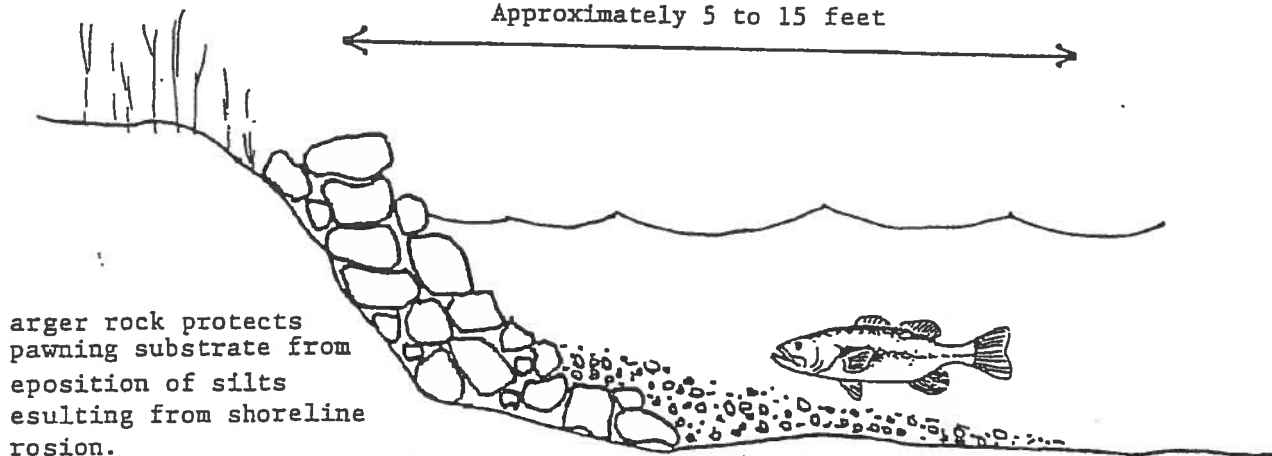
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Shallow rock and/or gravel reefs along shorelines

Approximately 5 to 15 feet

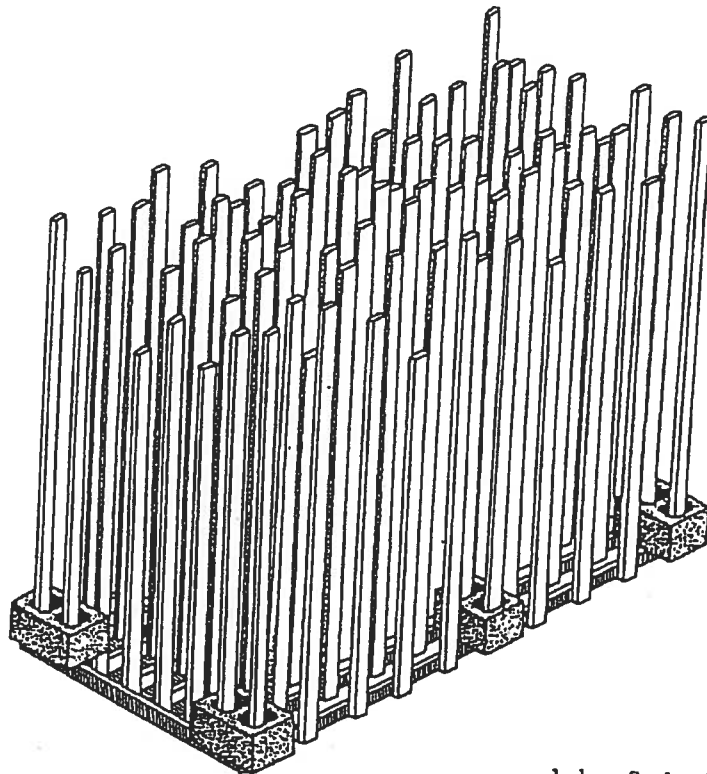


Larger rock protects spawning substrate from erosion and deposition of silts resulting from shoreline erosion.

Smaller rock and gravel provide spawning substrate.

FIGURE 3  
ROCK, GRAVEL AND CONCRETE RUBBLE REEFS  
(continued)

STAKE BED REEFS (FIGURE 4)



1 by 2 inch wood  
stakes attached to  
a weighted 4 by 8  
foot wood frame

Hollow PVC pipe bed  
reefs will be  
constructed in a  
similar fashion

FIGURE 4  
STAKE BED REEFS

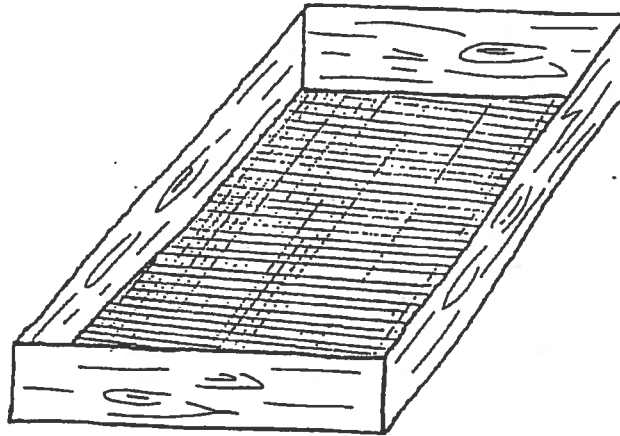
Artificial Reefs/Spawning Beds

GP 91-04. Amendment No. 4

Ponds, lakes and reservoirs  
within South Dakota

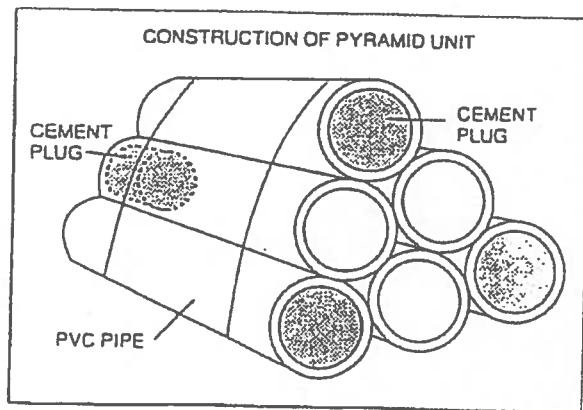
## SPAWNING BOXES (FIGURE 5)

Boxes approximately  
3 by 5 feet with  
wire mesh bottom



A 3 inch layer of  
 $\frac{1}{2}$  inch gravel will  
provide spawning  
substrate for bass

FIGURE 5  
SPAWNING BOXES



Large clay, concrete or  
plastic piping is weighted,  
bundled and placed to  
provide catfish and bullhead  
habitat. Pipes will typically  
be 3 to 5 feet long.

FIGURE 6  
PIPE STRUCTURES

Artificial Reefs/Spawning Beds

GP 91-04. Amendment No 4

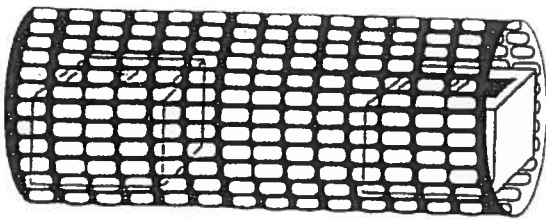
Ponds, lakes and reservoirs  
within South Dakota



a. Fish "condos"

Plastic snow fence material (w/1.5" by 2.5" openings) is formed into a 20 inch diameter tube and fastened with "zipties." Four galvanized fencing stays support the tube. One large concrete block "ziptied" to the tube serves as an anchor. A plastic lid provides cover and excludes predators.

PLASTIC SNOW FENCE STRUCTURES (FIGURE 7)



b. Bass "bungalows"

Bass "bungalows" are a shorter and smaller in diameter snow fence structure. Material is rolled, ziptied together and fastened to 3 support hoops made from corrugated polypropylene piping. Two 4"x8"x16" concrete blocks fastened to the interior anchor the structure.

FIGURE 7  
PLASTIC SNOW FENCE STRUCTURES

ANCHORED TREES (FIGURE 8)

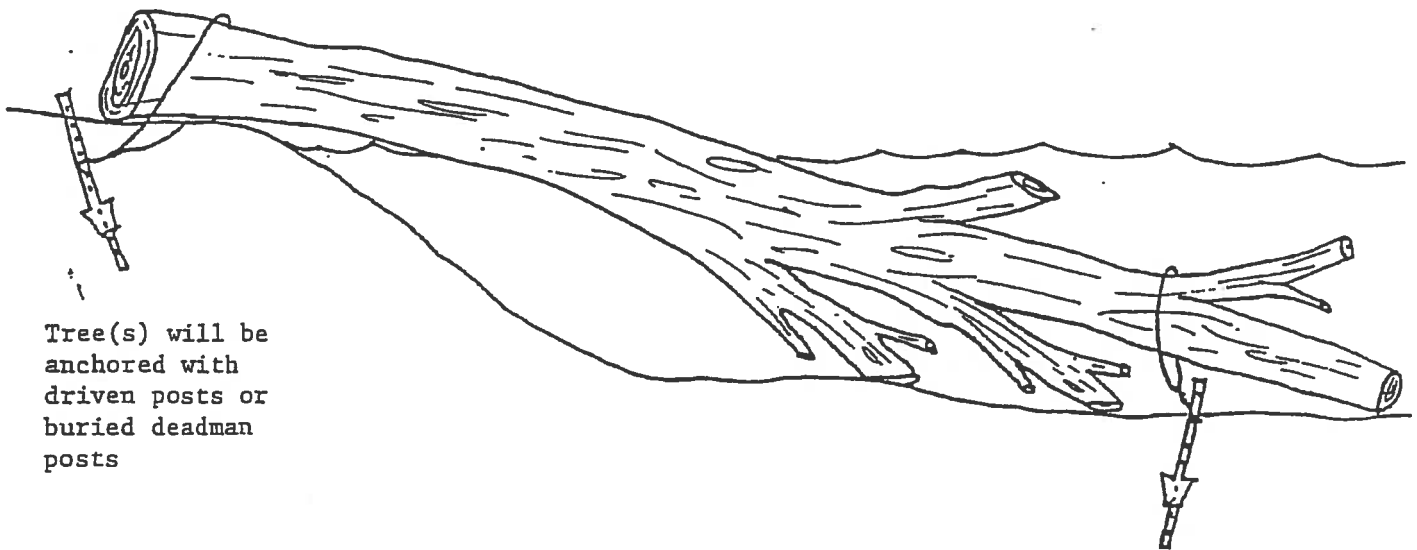


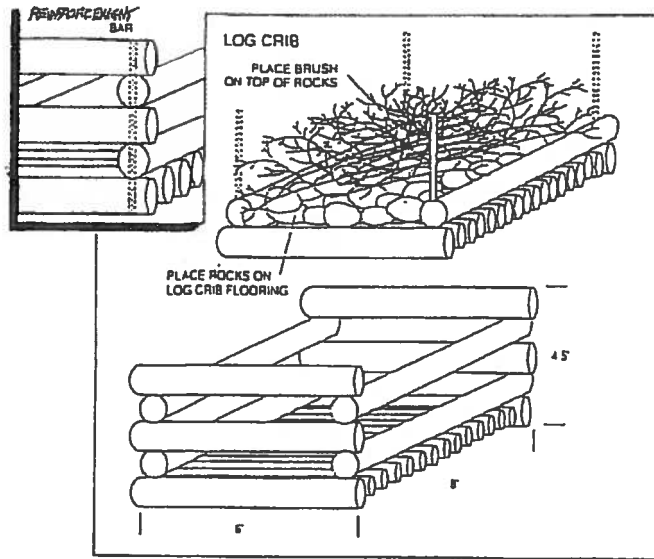
FIGURE 8  
ANCHORED TREES NEAR SHORELINES

Artificial Reefs/Spawning Beds  
GP 91-04, Amendment No. 4

Ponds, lakes and reservoirs  
within South Dakota

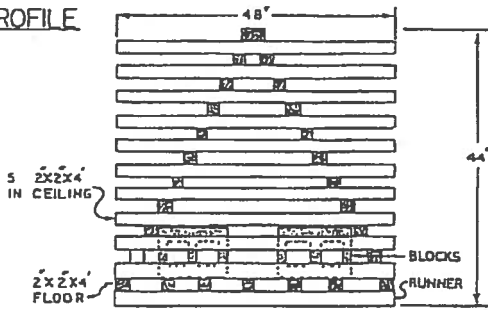
LOG OR LUMBER CRIB  
STRUCTURES (FIGURE 9)

LOG CRIB  
STRUCTURE

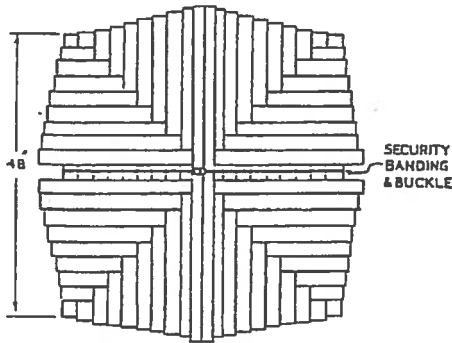


PORCUPINE BRUSH CRIB

PROFILE



PLAN  
PERSPECTIVE



MATERIALS:

- 52 - 2x2x4 ROUGH SOFTWOOD LUMBER
- 8 - STANDARD 8" INCH CONCRETE BLOCKS
- 2 - POUNDS - 16D COMMON NAILS
- 16 - 1/2" INCH NYLON BANDING
- 1 - 1/2" PLASTIC BUCKLE

FIGURE 9  
LOG OR LUMBER CRIB STRUCTURES

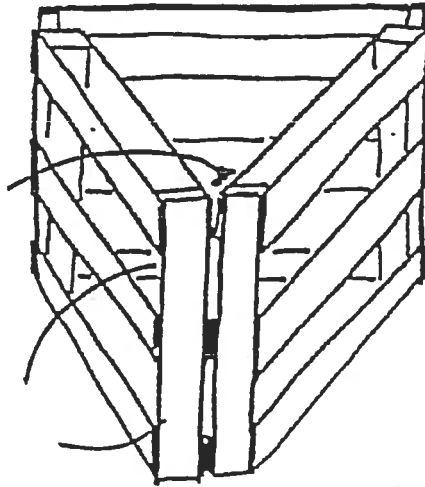
Artificial Reefs/Spawning Beds

Ponds, lakes and reservoirs  
within South Dakota

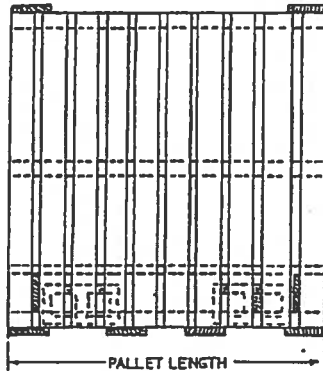
PALLET STRUCTURES  
(FIGURE 10)

TRIANGULAR  
PALLET STRUCTURE

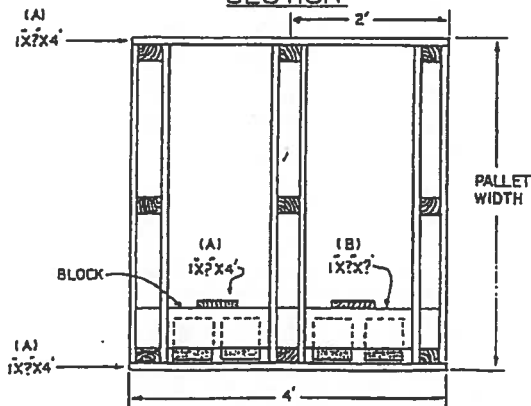
weighted w/concrete blocks or  
concrete bucket weights



VERTICAL PALLET STRUCTURE



SECTION



- MATERIALS:
- 3 WOODEN PALLETS (EQUALLY SIZED)
  - 8 1x7x4 ROUGH SOFTWOOD LUMBER (A)
  - 2 1x7x7 ROUGH SOFTWOOD LUMBER (B)
  - 8 STANDARD 8" CONCRETE BLOCKS
  - 1 BRUSH OR POLYPROPYLENE

FIGURE 10  
PALLET STRUCTURES

Artificial Reefs/Spawning Beds  
GP 91-04, Amendment No. 4

Ponds, lakes and reservoirs  
within South Dakota

HALF LOG OR PLANK COVER STRUCTURES (FIGURE 11)

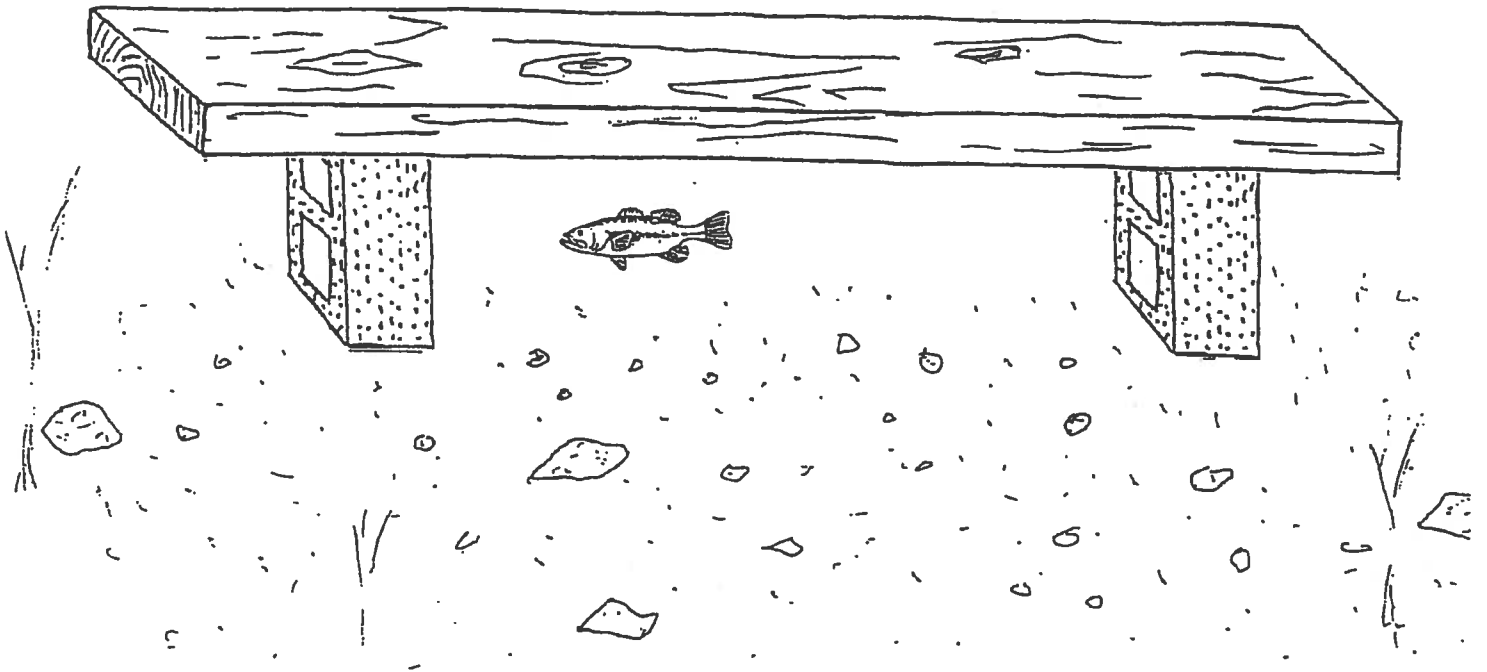


FIGURE 11  
HALF LOG OR PLANK COVER STRUCTURES

Artificial Reefs/Spawning Beds

Ponds, lakes, and reservoirs  
within South Dakota