

# TECHNICAL NOTES

U. S. DEPARTMENT OF AGRICULTURE

NEVADA

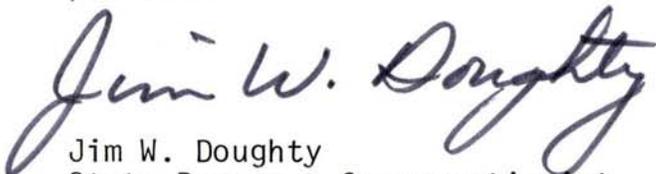
SOIL CONSERVATION SERVICE

TN - BIOLOGY - NV-17

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## DESIGNING A FARM POND FOR FISH PRODUCTION

Attached is a guideline for use when designing a farm pond for fish production.



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UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Land and Water Management  
Biology Training Series No. 20

DESIGNING A FARM POND FOR FISH PRODUCTION

I. Introduction

- A. Most farm ponds constructed for irrigation water storage, livestock water facilities, and erosion or flood control are generally inadequate for the production of fish unless special attention is given to the design of ponds to be used for this purpose.
- B. Farm ponds not designed for fish production generally have one or more of the following needs:
  - 1. Erosion control on the watershed to prevent pond siltation.
  - 2. Regulation of the amount of water flowing through the ponds.
  - 3. Deeper water -- particularly at inlet and around the pond margin -- to discourage vegetative growth.
  - 4. Fertilization to increase fish food supply and control aquatic weed growth and pond scum.
  - 5. Provision for drainage of pond to permit restocking or repair.
  - 6. Outlet structures designed to prevent fish loss.
  - 7. Holding adequate water reserves for fish even when the water level in irrigation reservoirs is low.
  - 8. Fencing to exclude livestock.
- C. Standard farm pond design features that are not specifically applicable to fish production problems are not included in this training outline.

II. Important features of farm pond design for fish production:

- A. Water supply and control
- B. Size
- C. Depth
- D. Outlets

III. Farm fish pond water supply and control

- A. Source of water:
  - 1. Springs
  - 2. Clear streams
  - 3. Irrigation ditches
  - 4. Wells
  - 5. Runoff from stabilized watersheds

(Safe water for trout must be within pH range of about 6 to 8.)

- B. Flow of water through pond:
  - 1. Constant flow may be desirable but not necessary.

2. Divert surplus water around pond.
  - (a) Headworks design
3. Pond can not be managed without full control of water.
4. Regulate flow to;
  - (a) Maintain desired depths
  - (b) Maintain proper oxygen content
  - (c) Prevent solid freezing in winter
  - (e) Keep surface foot of water below these temperatures for trout -- Rainbow - 75 , German Brown - 72° - 73°, Cutthroat - 70°, and Eastern Brook - 65°. Bass and Blue-gill need water temperatures of 70° or more for spawning.

#### IV. Farm fish pond size

- A. Ponds less than 1/3 acre will not support enough fish to afford much food or sport.
- B. Ponds of less than about 5 acres can be easily managed by one landowner.
- C. Size of pond commonly determined by fish production needs:
  1. A good trout pond should produce at least 100 pounds of fish per acre per year.
  2. Well managed bass-bluegill ponds have produced 200-400 pounds of fish per acre per year.

#### V. Depth of farm fish ponds

- A. A minimum of eight feet in 10% or more of the impoundment.
- B. A minimum depth of three feet for shoreline and any part of the impoundment. (Figure 1.)
- C. A minimum reserve of eight feet in irrigation reservoirs designed for seasonal storage.
- D. A minimum of three feet in irrigation reservoirs designed for short period (over-nite) storage

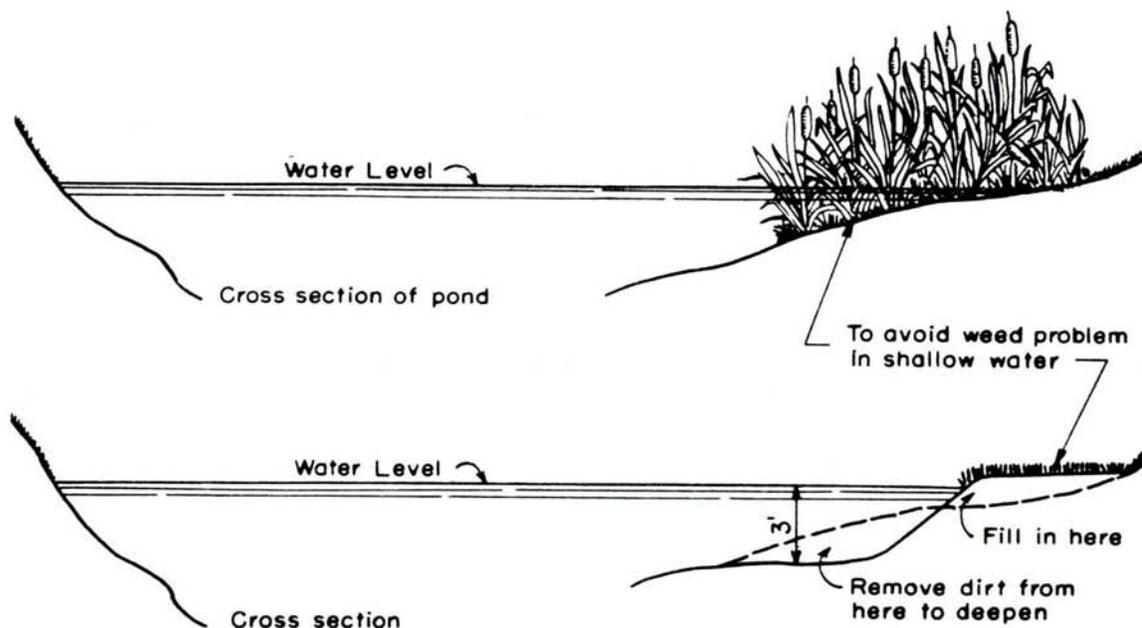


FIG.1 - Pond edges should be deepened to control emergent water plants and improve fishing.

C. Irrigation outlets.

1. Suitable screening arrangements (minimum  $\frac{1}{2}$ " screen) should be installed at irrigation system inlets.

D. Emergency spillway

1. Needed on all ponds where full control of water flow to pond is not obtained.
2. Design spillway wider than necessary to prevent fish loss. Fish avoid shallow depth and slower current in the wider opening.
3. Do not screen the spillway!

II. Pond protection.

A. Exclude livestock. Fence pond and provide stock tank outside of area.

B. Plant grasses, trees and shrubs to improve area for wildlife. (Figure 4.)

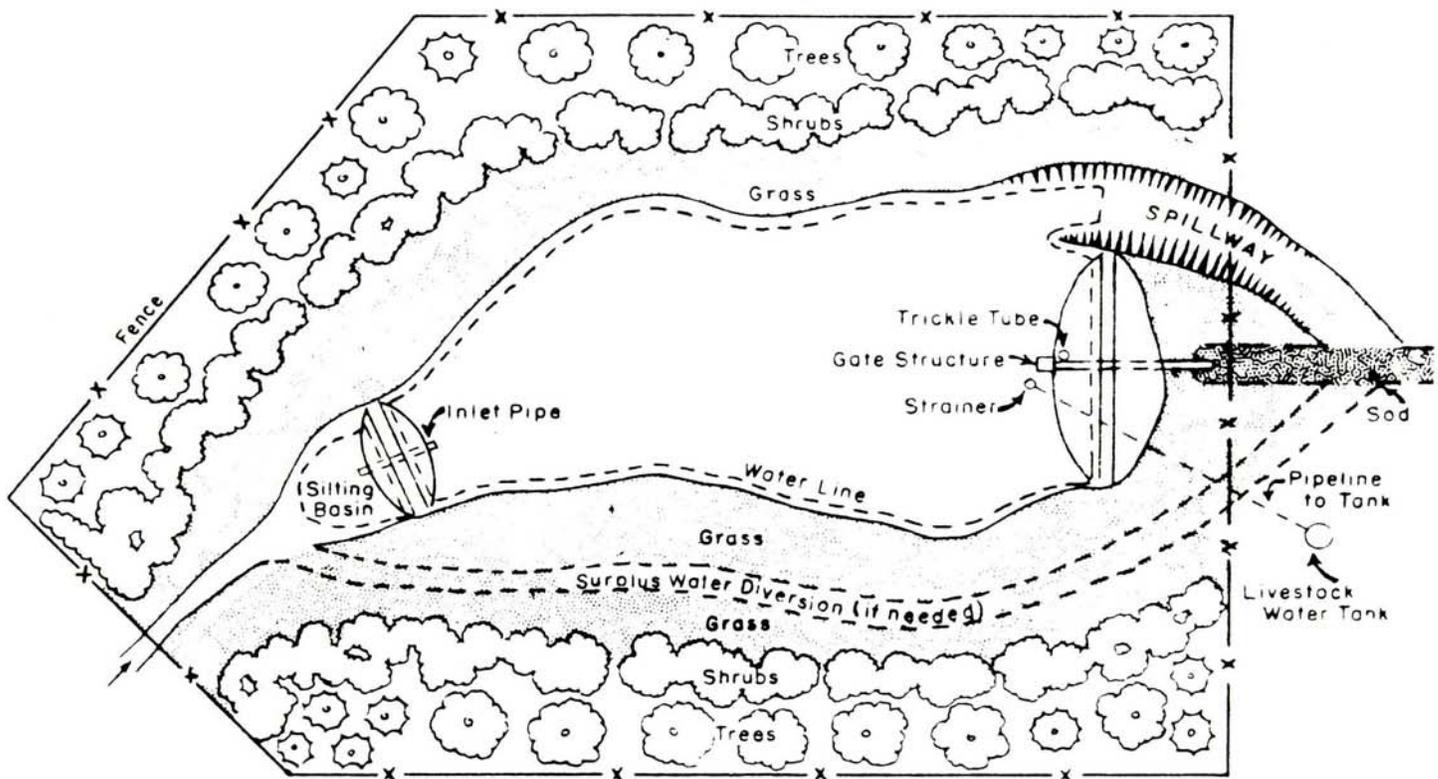


FIGURE 4. - Farm pond lay-out showing location of structures and wildlife planting areas.

II. Recommended reference reading:

- A. \_\_\_\_\_ Current. State Engineering Handbook.
- B. Compton, L.V., 1943. Techniques of Fish Pond Management. U.S.D.A. Miscellaneous Publication No. 528.
- C. Davison, Vern E., 1945. Farm Fish Ponds for Food and Good Land Use, U.S.D.A. Farmers Bulletin 1983
- D. \_\_\_\_\_ 1953. How to Build a Farm Pond For Fish Production Job Sheet. S.C.S. 7-L-14000-27
- E. Scheffer, Paul M., 1955. Fish Escape-Proof Pond Outlet Structures, Technical Note, Biology #4

## VI. Pond outlets

### A. Trickle tube

1. Eight inch minimum diameter vertical pipe draining into line through dam. This takes care of the small normal flow through the pond. Where impoundment has been stocked with trout, a second section of corrugated metal pipe is installed to partially enclose the trickle tube (Figure 2.)
2. Outside pipe (shield) is about 2X the diameter of the trickle tube. It extends from 5' to 6' below the approximate elevation of the emergency spillway.

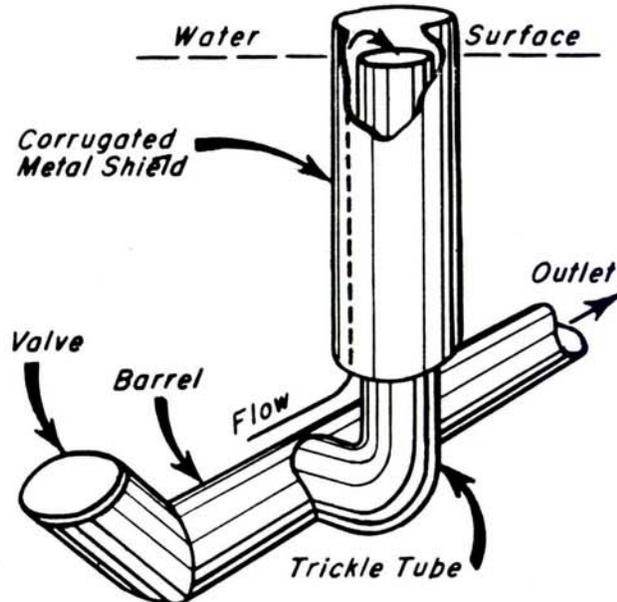


FIGURE 2 -  
Detailed Plan of Shielded Trickle Tube.

### B. Rectangular outlets.

1. Water levels in impoundments stocked with trout and having a rectangular concrete outlet should be made with a double flashboard installation. (Figure 3.)

Minimum of 2 feet freeboard above first flashboard if channel is also to be used as emergency spillway.

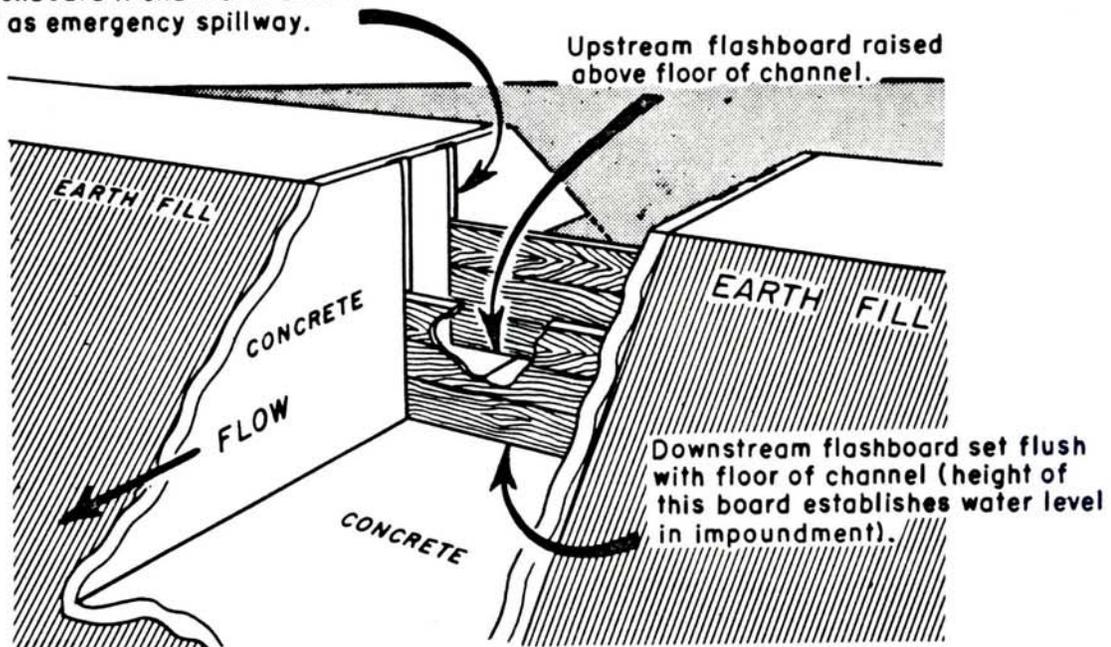


FIGURE 3 - Double Flashboard Installed in Concrete Spillway.