

# TECHNICAL NOTES

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U.S. DEPARTMENT OF AGRICULTURE STATE OF COLORADO NATURAL RESOURCES CONSERVATION  
SERVICE

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**BIOLOGY TECHNICAL NOTE NO. 31**

**21 March 2002**

**To:** All Area Offices  
All Field Offices

**From:** Terri Skadeland  
State Biologist

**Re:** Fishpond Management

## **Fishpond Management Fact Sheet Colorado NRCS - March 2002**

### **General Information:**

The following recommendations are based on the assumption that all water rights have been secured and the pond may be legally managed for a fishery. If these steps have not been taken, contact the Colorado State Engineer's office to develop a legal water right for the intended purpose. In some areas of the State, endangered or threatened species issues must be considered in addition to water law. Consultation with U. S. Fish and Wildlife Service must be completed, where applicable, prior to stocking fish or building ponds.

Colorado has both warm and coldwater ponds. The first step in managing a fishpond is to determine if the pond is a warmwater or coldwater pond and if a sustaining population is the goal or if supplemental feeding will take place. Check the watershed to determine if erosion appears to be a problem or if other types of runoff may influence water quality in the pond.

A good rule of thumb is to have 8 feet water depth over at least 1/3 of the pond. For example, a 3 acre pond should have 1 acre or more of 8 foot deep water (Kehmeier 1985). If the pond has a running water source or is spring fed, this maximum depth may be reduced to 6-8 feet.

Drainage area to water storage ratio depends on soils, topography, precipitation, vegetation in the drainage basin, and any other inputs such as springs. In Colorado, the drainage area to acre-foot of storage ratio ranges from 30:1 in the mountains to 100:1 for the most arid portions of the State.

Agriculture Handbook 590, Ponds-Planning, Design, Construction (USDA 1997) has good general information to help build a pond that will meet the needs of the landowner. Colorado NRCS Standard 378, Pond, may be used for pond design.

### **Coldwater Ponds**

(Information in this section was taken from "Trout in Farm and Ranch Ponds, USDA 1961, except as noted)

#### Temperature:

Coldwater ponds in Colorado are generally trout ponds. Temperature is the first and often the most critical factor to consider in determining if a pond will support trout species. Water temperature should be no warmer than 70 degrees Fahrenheit at a 6 inch depth in order to meet habitat needs for trout. The top 6 inches of water may exceed 70 degrees as long as the deeper water is colder. Best growth is obtained in water of 55 to 68 degrees Fahrenheit. Trout grow slowly in waters that are colder than 50 degrees Fahrenheit.

#### Water Quality:

Targeted water quality goals should meet Colorado's State water quality standards. The most critical values for coldwater aquatic life are:

dissolved oxygen	6 mg/L
pH	6.5-9.0
nitrite	0.05 mg/L
nitrate	10 mg/L
ammonium (chronic)	0.02 mg/L

Numerous other water quality parameters have established standards. These may be accessed at: <http://www.cdphe.state.co.us/>

### **Stocking**

Before recommending stocking to a client, the NRCS planner should evaluate water quality and physical habitat conditions to ensure there are no obvious impediments to a fishery. The effect of any existing fish in the pond must also be assessed before adding new fish. Once any concerns are addressed, the planner may proceed with a stocking recommendation.

Recommended trout stocking rates are 300-600 fingerlings (2-4 inches) or 500-1,000 fry (1-2 inches) per surface acre. At these rates, under favorable conditions, trout should

grow an inch a month up to 9-10 inch size. Brown, rainbow, and cutthroat trout don't usually reproduce in ponds. Therefore, restocking is recommended every 2-3 years. Depending on fishing pressure, stocking and restocking should be done in the spring or fall when surface water temperatures are below 65 degrees Fahrenheit.

Rainbow trout are usually the preferred pond species, however brook and cutthroat trout are satisfactory above 8,000 feet elevation. Brown trout are more cannibalistic than rainbows and brook trout, so aren't usually stocked.

Channel catfish may be stocked with trout at the rate of 25 per acre. Catfish occasionally stir up bottom sediment and make a pond turbid. Landowners should be apprised of this situation before recommending catfish in a pond.

Trout may be fished the year following stocking if fingerlings are used.

### **Warmwater Ponds**

Refer to "Colorado Warmwater Pond Handbook" (attached), by James R. Satterfield, Jr. and Stephen A. Flickinger, CSU Fisheries Bulletin No. 1.

### **Sources of Fish for Stocking**

The Colorado Aquaculture Association's web page lists many of Colorado's fish producers. Their web page is at: <http://www.colaquaa.org/>. The Yellow Pages of the local phone book may contain other companies in addition to those listed on the aquaculture web page. The NRCS does not recommend one company over another.

### **Aquatic Weed Control**

Excessive aquatic plant growth interferes with fishery production and utilization. Biological, chemical, and mechanical methods may be used to control aquatic weeds.

#### **Biological Controls**

Duckweed may be controlled by 6-8 ducks per surface acre. It may be prevented by clearing vegetation around the pond to allow increased wind action; removing logs, brush, and debris from the water; and controlling submersed weeds.

Grass carp are sometimes used to control aquatic vegetation. If this option is selected, contact the local Colorado Division of Wildlife Biologist to determine the need for permits.

#### **Mechanical Controls**

Seining may be used to remove floating waterweeds (duckweed, etc.).

Submersed waterweeds may be cut with a scythe, barbed wire or cable pulled by a tractor, or hand operated mowers adapted to aquatic situations.

Shading with a black vinyl/polyethylene tarp will kill plants by preventing photosynthesis.

Emergent vegetation (cattail, bulrush, etc.) may be controlled by deepening the pond margin so water depth goes to 3 feet as rapidly as possible. When deepening the pond margin, safety must be considered. Someone falling into a steep sided pond may not be able to climb back out. Any necessary permits such as a 404 permit and water rights must also be secured before deepening a pond.

### **Chemical Controls**

Several aquatic chemicals, ranging from herbicides to dyes that slow photosynthesis are available for use controlling aquatic weeds in ponds. A licensed, professional pesticide applicator should be contacted for advice and assistance on chemical use. Many aquatic consulting firms have staffs licensed for chemical applications.

### **Fish Kills**

Occasionally a fish kill occurs in a pond. Assuming there is no toxic runoff entering the pond, a good assumption is that the fish kill was caused by low oxygen levels in the pond. This can happen in winter or summer.

Warm water holds less dissolved oxygen than cold water so pond water in the summer generally has less oxygen than in the winter. In the summer, if a large amount of organic matter (green plants-algae, submergent vegetation, and emergent vegetation, fish food, etc.) in a pond decays, the result may be a fish kill. This problem is accentuated when skies are cloudy (preventing or slowing the rate of photosynthesis), winds are calm (no wind action to introduce oxygen), and temperatures are high (less oxygen at high temperatures). When these conditions occur, oxygen levels decline-sometimes enough to kill fish.

In the winter, if snow covers the ice and prevents sunlight from reaching the green plants, then photosynthesis stops. In addition, the plants may die and, again, use up oxygen in the decay process. If conditions are severe enough or last long enough, a fish kill occurs.

Both winter and summer fish kills may be prevented by controlling aquatic vegetation and/or by mechanical aeration. Winter fish kills may be prevented or lessened by removing snow cover from the ice if the ice is thick enough to safely accomplish this task.

### **References:**

Kehmeier, K.J. 1985. Farm pond requirements to support fish. Colorado State University Service in Action Bulletin no. 6.403.

USDA. 1961. Trout in farm and ranch ponds. USDA Farmers' Bulletin No. 2154. 18pp.

USDA. 1997. Ponds-planning, design, construction. Agriculture Handbook 590. USDA-Natural Resources Conservation Service, Wash. D.C. 85pp.