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TECHNICAL NOTE

Bureau of Land Management U.S. DEPARTMENT OF THE INTERIOR

EVALUATION OF EXCAVATED FISH REARING POOL IN VINCENT CREEK

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I. INTRODUCTION

The streams of southwestern Oregon that flow through the tyee sandstone formation in the region often lack sufficient pool rearing area to support extensive populations of salmonids during low summer flows. A test rearing area was created in Vincent Creek to determine if such areas would provide habitat for salmonids during the late summer low water critical period. The results of this experiment appear favorable and applicable to other streams that lack sufficient rearing pool area. Several smaller pools were created during this work, but the experimental pool described shows the most promise.

II. BACKGROUND

Vincent Creek was selected as a stream improvement pilot project since absence of rearing pools in the mainstem were a limiting factor. A ratio of 80 percent riffle to 20 percent pool was estimated after detailed stream survey. Most of the riffle area is less than three inches deep. Several natural self-cleaning pools were found to provide excellent fish habitat.

It was decided that the creation of pools would be the single most beneficial habitat improvement that could be economically undertaken. The use of small dams or log sills was considered and rejected for these structures could not provide a permanent pool area in bedrock and would require periodic maintenance. After studying the natural pool areas for more than a year, it was decided that construction of similar pools was desirable. Proper location was a necessity if the pools were to retain their full size. A small waterfall or plunge at the head of each pool appeared necessary to accomplish proper flushing. One natural pool with a two-foot plunge was completely filled by a landslide but cleaned itself of most debris after two winters of high flows during freshets.

III. DESCRIPTION

An experimental pool was excavated by blasting in the fall of 1970. A track-drill was used to make the powder holes and the material was shot free of the hole by using heavy charges coupled to a time delay sequence. (Illustration 1) The material shot free of the hole was loaded on a dump truck with a front end loader; the rock was then used as road riprap. Inspection of the area revealed that the heavy charges blew away much of the vegetative canopy and barked surrounding trees.

The work was accomplished through the use of a force account crew which makes it difficult to calculate the equivalent cost to excavate a similar hole through a bid contract. It is estimated that the test hole cost approximately $500-$600. Larger 20-foot by 50-foot pools, which will be blasted for the future Vincent Creek pilot project, are estimated at this time to cost under $1500.

The pool was created at the mouth of a small tributary in order to take advantage of the cold water supplied in warm weather. During summer low flow, Vincent Creek was approximately 50 feet wide in this area and about 2 to 3 inches deep over a solid sheet of bedrock. (Illustration 5) The resulting pool was approximately 20 feet long and 25 feet wide. The upstream end was about 9 feet deep and downstream end 4 to 5 feet deep. (Illustration 2)

The pool has now been subjected to two winters of severe high water. A state of "natural repose" appears to have been reached at about 4.5 feet of depth. Some silted gravel is deposited around the less turbulent areas of the pool and these fluctuate 1-1½ feet annually depending upon severity of freshets. Illustration 4 shows the general flow patterns that have developed in the pool.

In Oregon and several other states working in a stream is subject to state law and also may require permission for underwater blasting.

IV. EVALUATION

The test hole was blasted out of a flat sheet of bedrock which did not result in a high plunge at the head of the pool necessary for complete flushing. The gradient of the stream provided only a 3 to 6-inch plunge at the head of the pool. The test pool should have had at least a one-foot plunge to keep the pool flushed. Consequently, the pool has filled to a depth of 4.5 feet as shown in Illustration 2.

The 20-foot length of the test pool was too short to allow the water to slow down before it hit the back of the pool. The larger natural pools are about 50 feet long and generally have a small gravel deposit dropped by the slowing water. These deposits are used heavily by steelhead trout for spawning. The gravel and smaller materials laid down at the tail of the pool also provide environment for aquatic life of all types that are excellent fish food.

In order to retain a natural appearance, it is advisable to use lighter charges and excavate the materials from the hole with a back hoe or clam shovel. This procedure would entail diverting the water around the work site during excavation. Objectionable drilling silt would be

Illustration 1.

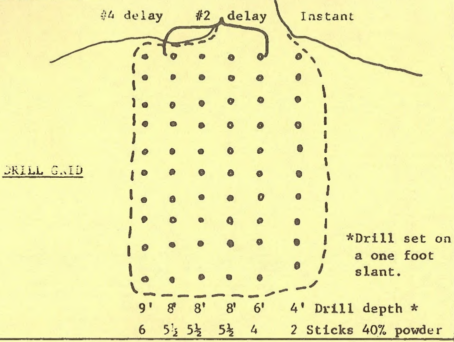
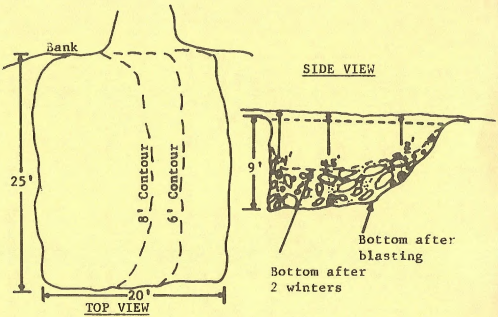


Illustration 2.



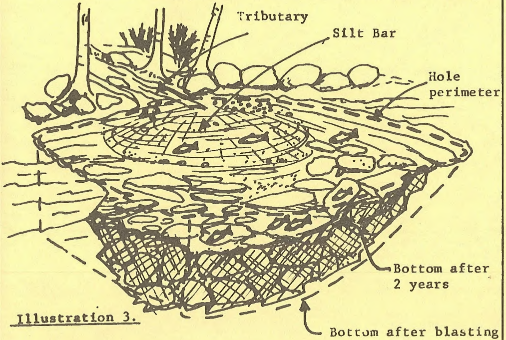


Illustration 3.

CUT-AWAY DIMENSIONAL VIEW

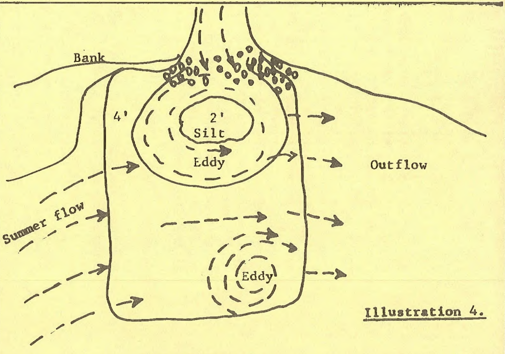


Illustration 4.

FLOW PATTERN

prevented from entering the stream and diversion provides a dry work area. Drilling silts from the work site are highly visible and must receive attention during the advanced planning stage to prevent objectionable reaction by the public.

The area was virtually devoid of fish life and most other aquatic life was in limited supply before creation of the pool. Sampling of the pool has shown an abundance of fish life and aquatic organisms. Several adult cutthroat trout were present. Juvenile cutthroat trout, steelhead trout and coho salmon were numerous. Blacknose dace and redside shiners were extremely abundant. Cottids and brook lamprey were present. Crayfish, periwinkles, caddis fly larva and many other aquatic organisms were abundant. It was estimated that the total fish population in the pool ranged from 200-400 and approximately 50 percent of the fish were salmonids.

V. SUMMARY

The test pool has been in existence for more than two years. It is considered successful at this time because:

1. It provides habitat for all forms of aquatic life as well as an extensive fish population.

2. It is self-cleaning and maintenance free.

3. It is reasonably economical to construct.

4. It is aesthetically and environmentally acceptable in that it looks completely natural two years after creation.

Illustration 5.

Track drill and operator working during late summer low flow. The Alder tree in the upper right corner of the photo can be used as a reference mark when viewing the pool after creation as seen in illustration 6.

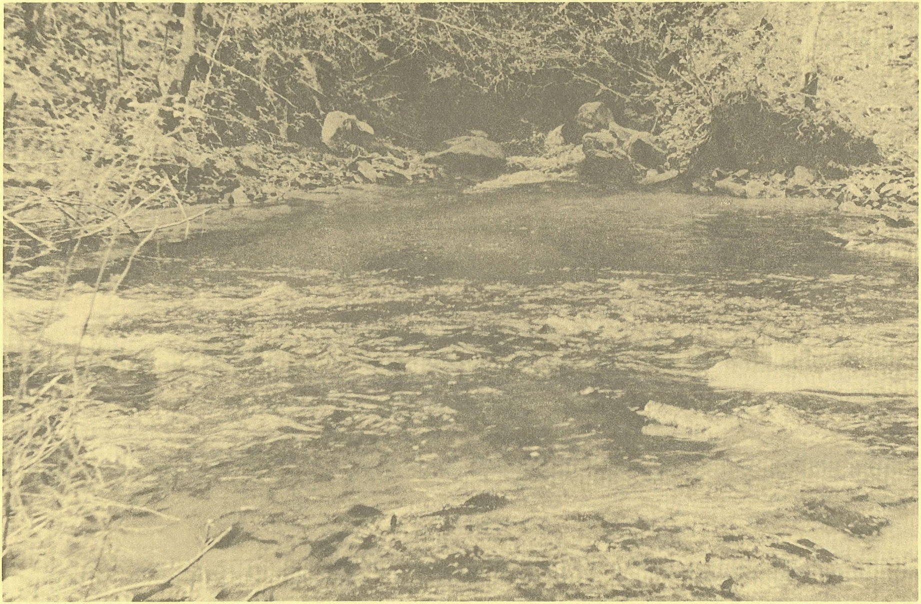


Illustration 6.

Photo of test pool taken after creation during a period of moderate winter flow. Note the slack water area on the far side of the pool where an eddy has formed at the mouth of the tributary.